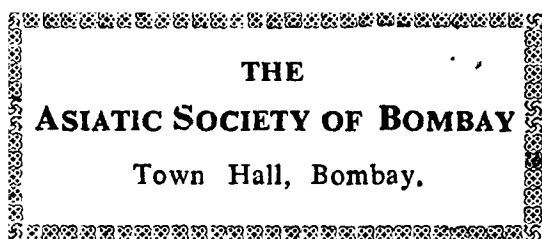


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NOTES
ON THE
ECONOMIC PRODUCTS
OF THE
NORTH-WESTERN PROVINCES.

PART V.

GOURDS; VEGETABLES; SPICES AND CONDIMENTS; GREENS; FRUITS, CULTIVATED AND WILD; UNCULTIVATED EDIBLE PRODUCTS.

A CONTRIBUTION TO THE SERIES ISSUED BY THE DIRECTOR, AGRICULTURE AND COMMERCE.

By EDWIN T. ATKINSON, B.A., F.R.G.S.,

Bengal Civil Service.

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ALLAHABAD:

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1881.



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NOTICE.

THE following pages are in continuation of the programme marked out in Part IV. The notes attached to the description of each plant are derived from personal observation, the reports of fellow-labourers in the field of economic botany, and the writings of Hooker, Brandis, Madden, Stewart, Roxburgh, Birdwood, and others. They were originally undertaken for the purposes of the District Memoirs, and then it was thought better to reserve them for a "Dictionary of Economic Botany" for these Provinces; but as I see no possible chance of obtaining the leisure necessary for such an undertaking, I now give to my brother officers the results of what I may fairly call a life's labour in these classified notes, of which this is a fifth part. The first part was devoted to "Gums and Gum-resins," and the second to "Economic Mineralogy." The third part, containing "Tans and Dyes," includes all my notes on that section, with much other matter prepared by Mr. E. C. Buck. I am the more satisfied that these notes should appear in their present rough form since, as my connection with these provinces has been severed, I shall not again be able to revise them for publication. It may be well to note that the references throughout are to—

Hooker's 'Flora of British India.'

Clarke's edition of Roxburgh's 'Flora Indica.'

Drury's 'Useful Plants of India.'

Drury's 'Handbook of the Indian Flora.'

Waring's 'Pharmacopœia of India.'

Brandis's 'Forest Flora of North-West and Central India.'

ALLAHABAD: }
19th February, 1881. }

E. T. ATKINSON,
Bengal Civil Service.

ERRATA.

PAGE	3	READ,	<i>Citrullus Colocynthis</i> , <i>Momordica Charantia</i> , <i>M. Balsamina</i> , <i>Cucumis Melo</i> , <i>Citrullus Colocynthis</i> , <i>Cucurbita Pepo</i> , in all of which the specific name commences with a capital letter.
"	4	"	<i>T. Scotanthus</i> .
"	6	"	<i>L. Satpatia</i> : <i>Momordica Luffa</i> .
"	7	"	<i>Cucurbita Pepo</i> : <i>Momordica Charantia</i> .
"	9	"	<i>Cucumis Melo</i> : <i>C. Chata</i> .
"	10	"	<i>Citrullus Colocynthis</i> : <i>Cucurbita Citrullus</i> : <i>Cucumis Citrullus</i> .
"	11	"	<i>Citrullus Colocynthis</i> : <i>C. Melopepo</i> : <i>C. Camolenga</i> .
"	12	"	<i>Cucurbita Pepo</i> , <i>M. maderaspatana</i> .
"	13	"	<i>Rapa</i> , <i>Sabdariffa</i> , <i>Fœnum-græcum</i> , <i>Carota</i> , <i>Scolymus</i> , <i>peruviana</i> , <i>bengalensis</i> , <i>Cepa</i> , <i>Jatropha Manihot</i> , <i>Colocasia himalensis</i> .
"	14	"	<i>Sabdariffa</i> .
"	15	"	<i>Fœnum-græcum</i> , <i>africana</i> , <i>asiatica</i> .
"	17	"	<i>Carica</i> .
"	18	"	<i>Carota</i> , <i>Scolymus</i> .
"	20	"	<i>Melongena</i> .
"	21	"	<i>bengalensis</i> .
"	22	"	<i>Cepa</i> , <i>Schœnoprassum</i> : <i>Porrum</i> : <i>Jatropha Manihot</i> .
"	25	"	<i>himalensis</i> : <i>Carui</i> , <i>Cyminum</i> , <i>Anisum</i> , <i>Betle</i> , <i>Tamala</i> , <i>Catechu</i> .
"	27	"	<i>Sowa</i> : last line, after 'ridges' insert 'of fruit.'
"	28	"	<i>Sowa</i> : <i>Carui</i> : <i>Athamanta</i> .
"	29	"	<i>Ajowain</i> , <i>Ajowan</i> .
"	30	"	<i>Cyminum</i> : <i>Ponmorium</i> : <i>Anisum</i> .
"	32	"	<i>Betle</i> : <i>Betle</i> : <i>Sesbania</i> for <i>Aeschynomene</i> .
"	33	"	<i>Tamala</i> : <i>Tamala</i> : <i>Cassia</i> : <i>Curcuma</i> .
"	34	"	<i>Zingiber</i> .
"	36	"	<i>Catechu</i> .
"	37	"	<i>Fœnum-græcum</i> : <i>Basilicum</i> .
"	39	"	<i>Eruca</i> : <i>Armoracia</i> .
"	40	"	<i>Fœnum-græcum</i> .

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[illegible]

ADDITIONAL 'ERRATA.'

Page	44	for	'Ephædra'	...	...	read	'Ephedra'
"	42	"	'Ocymoides'	...	...	"	'ocimoidea'
"	95	"	'Bishkhapra'	...	...	"	'Bishkhopra'
"	26	"	'Ilāchi'	...	...	"	'Ilāichi'
"	13	"	'tuberosa'	...	...	"	'tuberosus'
"	98	"	'Tam'	...	...	"	'Yam'

NOTES ON THE ECONOMIC PRODUCTS OF THE NORTH-WESTERN PROVINCES.

PART V.

A. GOURDS.	E. FRUITS, CULTIVATED AND WILD.
B. VEGETABLES.	F. UNCULTIVATED EDIBLE PRODUCTS.
C. SPICES AND CONDIMENTS.	
D GREENS.	

CULTIVATED VEGETABLES.

THE vegetables grown more commonly in these provinces are those described in the following list. These may be divided into three classes :—(1) those, like the gourds, eaten raw or cooked ; (2) those generally boiled in water with salt and spices or cooked with *ghi* and oil as the ordinary garden produce, radishes, onions, carrots, turnips, *blindis*, and the legumes of various plants and known generically as *tarkári* ; (3) the leaves and stems of several herbaceous plants which boiled in water form what is known as *ság* or greens, and when cooked merely with a quantity of water sufficient to prevent their burning are known as *bhángi* or *bhangiya*. The first class comprises a great proportion of the food of all classes during the months that they are in season and form one of the most important dietetical products of native horticulture. The second class forms the staple of the curries eaten with flesh by Muhammadans and with *dál* and rice by Hindus and forms a most important element of the food of all classes in this country. The third class comprises both plants specially cultivated for greens ; the leaves and parts of plants cultivated for seed, fruit or fibres, but not specially cultivated for this purpose, and the roots, bark, leaves, seeds, and flowers of an immense number of wild plants which are found to be edible, and form a substitute for cultivated produce especially in times of scarcity. I have divided this portion of my subject according to the above plan ; first comes the gourds ; second, ordinary vegetable produce or *tarkári* ; third, condiments and spices ; fourth, those plants that are cultivated for greens ; fifthly, fruits and berries, wild and cultivated, and lastly, the principal wild plants that are considered edible and form a portion of the food of the people. In a work

like the present one, intended especially to economize space in the descriptive account of these provinces, an account of the mode of cultivation of every article of food would be out of place, and especially of garden produce. I have therefore merely in the briefest manner described the class of plant and refer the reader to the works of Speede, Riddell, Firminger, Pogson, and others, for any further information he may wish for on matters of detail apart from the scope of this work.

A.—Cucurbitaceæ or Gourds.

The gourds are extensively cultivated on the banks of all the great rivers in these provinces and are thus described by Clarke. *Cucurbitaceæ*: climbing herbs or shrubs; tendrils solitary, lateral, spiral, simple or divided. Leaves alternate, petioled, frequently cordate, simple lobed, or pedately divided. Flowers monœcious or diœcious, yellow or white, racemed and solitary, less commonly paniced. Calyx-tube wholly adnate to the ovary (except in *Actinostemma*); limb rotate, campanulate or tubular; lobes 5 (rarely 3), imbricate. Petals 5, inserted on the calyx-limb, united in a tube or nearly or quite free, sometimes fimbriated at the margin, valvate or involute in the bud. Stamens inserted at the mouth or about the middle, or at the base of the calyx-tube, usually 3 (sometimes 5 or 2); anthers free or united into a tube, one usually 1-celled and the other two 2-celled, cells straight or flexuose or con-duplicate, the connective sometimes crested or produced. Ovary inferior (in *Actinostemma* half-superior), usually 3-carpellary; style one with 3 stigmas, more rarely styles 2-3-4; placentas usually 3, vertical, in double lines, the edges of the carpellary leaves being often turned in so far that the ovary (in flower time even) is spuriously 3-celled; ovules usually many, horizontal, rarely pendulous, sometimes few and pendulous from near the top of the ovary (in *Dicelospermum* 3 erect from the base of the ovary?) Fruit generally berried or fleshy, indehiscent or dehiscing by valves or by a stopple, often 1-celled, the seeds being often packed in pulp or fibre. Seeds usually many, often compressed, horizontal, pendulous (or in *Dicelospermum* erect), frequently corrugated or subspinose on the margins, albumen 0. Distrib. Species 400, in the warmer parts of the whole globe, especially in the tropics. Clarke in *Hooker, Fl. Ind., II.*, 604.

The gourds are drastic, pulpy and refreshing, but apt to produce evil effects if taken in inordinate quantities. The principal species cultivated and used in a wild state are noted below. They may be divided for their dietetic properties into three classes, the pleasant-tasted with a refreshing juice eaten raw, viz., the *kharbūja* or melon; the *tarbūja* or water-melon, and the *kachra*, which last is, however, occasionally cooked: second, the other edible

gourds which are either bitter or insipid and are all cooked before being eaten ; and third, those cultivated and used for their medicinal properties only, as the *Citrullus colocynthis* and certain species of *Trichosanthes*. I have included here both the wild and cultivated varieties in order to give a general view of the whole family and their uses.

The principal genera represented in these provinces are *Trichosanthes*, *Lagenaria*, *Luffa*, *Benincasa*, *Momordica*, *Cucumis*, *Citrullus*, *Cucurbita*, *Cephalandra*, *Bryonia*, *Mukia*, and *Ctenolepis*.

GOURDS.

<i>Trichosanthes palmata</i> .	<i>Cucumis melo</i> .
„ <i>anguina</i> .	„ <i>sativus</i> .
„ <i>cucumerina</i> .	<i>Citrullus colocynthis</i> .
„ <i>lobata</i> .	„ <i>vulgaris</i> .
<i>Lagenaria vulgaris</i> .	<i>Cephalandra indica</i> .
<i>Luffa ægyptiaca</i> .	• <i>Cucurbita maxima</i> .
„ <i>acutangula</i> .	„ <i>moschata</i> .
<i>Benincasa cerifera</i> .	„ <i>pepo</i> .
<i>Momordica charantia</i> .	<i>Bryonia laciniosa</i> .
„ <i>balsamina</i> .	„ <i>rostrata</i> .
„ <i>dioica</i> .	<i>Mukia scabrella</i> .
<i>Cucumis trigonus</i> .	<i>Ctenolepis Garcini</i> .

Trichosanthes palmata, Roxb. ; *T. laciniosa*, *cordata*, *anguina*, and *Bryonia palmata* and *Cucurbita melopepo* of Wallich ; *T. bracteata*, Kurz ; *T. tricuspis*, Miq.—*Indráyan*, *parwar*, *palwal*, *makhál*; occasionally *lál-indráyan*.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*, climbing often 30 feet. Diæcious so far as all the examples go, but Roxburgh has placed it in *Monœcia* without remark. Leaves 2-6" diameter, not at all hairy beneath, usually glabrous or less commonly scabrous on the nerves, often with several large glands near the apex of the petiole, cordate at the base ; segments dentate, serrate, divaricate, sometimes subpinnatifid (var. *incisa*, Heyne), usually acute (but obtuse in var. *sinuata*, Heyne) ; petiole 1-3". Tendrils commonly 3-fid. Male peduncles usually paired, the racemed are 6" naked below ; bracts ovate or obovate, glabrous or viscid, with scattered glands or pubescent. Calyx-tube 1½" closely tomentose or glabrous, teeth, long, lanceolate, sometimes dentate, serrate, or subpinnatifid. Fruit 1½-2" in diameter, not acute, bright red, with 10 orange streaks. Seeds very many, immersed in green pulp. The extreme forms of the leaves are var. *laciniosa*, Wight, which has the leaves palmate nearly to the base, the segments scarcely ¼" wide and sometimes subpinnatifid ; and var. *Thomsoni* from Moradabad with the leaves entire and slightly 5-angular : in both the leaves are coriaceous and with their petioles more or less covered with scattered round white minute flat scales. The Himalayan specimens recede farther by their large subsucculent flaccid leaves and very large flowers. Hooker, Fl. Ind., II., 607.

Roxburgh describes this species as having stems angular, very long, running over trees, covered with a grey scabrous somewhat corky bark, the young green parts smooth, tendrils 3-cleft, leaves petioled, generally palmate, though sometimes 3-5 lobed, divisions acute, slightly serrate, 3-5 nerved, smooth, having frequently several round glandular hollow spots on the underside, petioles

channeled, stipules single, small, axillary-male flowers racemed, large, white, fringed with long white ramous filaments; female flowers generally axillary, peduncled and sometimes racemose; fruit globular, smooth, size of a small orange, when ripe deep red. Roxburgh, 695; Drury, F. P., I., 467.

There are several varieties known by separate local names. Clarke notes two:—*T. scotanihus*, Clarke: calyx-teeth broad-lanceolate, entire, petals nearly destitute of fimbriations, especially in the female; and *T. tomentosa*, Heyne, leaves tomentose beneath, divided not more than half-way down. *T. palmata* is the *lāl-indrāyan* of the plains and *indrāyan* of Kumaon: it is occasionally cultivated and is edible when boiled. It has a globose red fruit, the size of an orange, and when wild is possessed of severely drastic properties. *T. dioica*, Roxb., (Hooker, Fl. Ind., II., 608) is the *palwal* of these provinces, which yields a small gourd about 4" long by 2" broad. It is eaten boiled and has an insipid taste, but still is much sought after for curries and the like as the only one in season during the first part of the rains. *T. nervifolia*, Linn., is the *panwar* of the plains. *T. lobata*, Roxb. (694), also occurs wild in different parts of these provinces. The edible variety is cultivated all over these provinces from the Dúns and Kumaon to Bundelkhand. *T. cordata*, Roxb., has a fruit almost exactly as in *T. palmata*, bright red, orange-streaked, apex not acute. Roxburgh, 695: Hooker, *ibid*, 608.

Trichosanthes anguina, Linn. Common snake gourd—the *chachinda* of Kumaon, *chachinga* of Rohilkhand, and *jhajhinda* of other parts of the plains.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Leaves cordate, sub-reniform, 3-7 lobed or 5 angular, lobes not acuminate, pubescent or puberulous on both surfaces; fruit polymorphous, usually elongate cylindric, sometimes contorted; seeds corngate. Hooker, Fl. Ind., II., 610; Drury F. P. I., 467; Roxburgh, 694.

It is grown extensively in the plains and throughout Kumaon and appears to be the cultivated variety of *T. cucumerina*, with which it agrees except in the fruit. The fruit is greenish-white, from 2 to 3 feet long, and is usually eaten cooked.

Trichosanthes cucumerina, Linn. *T. laciniata*, Klein; the *T. pilosa*, *Bryonia umbellata*, and *Cucumis Missionis* of Wallich. Wild snake gourd.—*Jangli chichinda*, *patol*, *ban-patol*, *kundori*.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Stems twining, more or less pubescent. Diœcious or less often (? when cultivated) monœcious. Leaves 2-4" diam., usually 5-lobed, about half way down; lobes obtuse, or if acute not acuminate; petiole $\frac{1}{2}$ "; tendrils 2-fid. Male peduncles in pairs, the earlier 1-flowered, the later racemed; occasionally in place of the earlier is found a female. Calyx-tube 1 in. Seeds $\frac{1}{2}$ -1" half-ellipsoid, compressed in red pulp. In Bth. and Hk. f. Gen. Pl. i. 833, under *Ceratosanthes*, *T. cucumerina* is a misprint for *T. corniculata*. Hooker, *ibid*, 609; Drury, l. c. preceding and U. P., 40; Roxburgh, 694.

Indigenous in Moradabad (T.); in Bánda in rocky places (Edge.), and in Kumaon Bhábar (M). The fruit is used in medicine chiefly, but Royle

says (p. 219) that it is edible. Roxburgh thus describes his specimens :—

Stems 5-sided, slightly downy, tendrils 3-fid. Leaves broad, cordate, angular, and sometimes lobed, toothed, downy, very various in size. Male flowers racemose, small, white, and beautifully fringed; racemes axillary, erect longer than the leaves; many flowered. Female flowers axillary, solitary, short, peduncled like the males. Fruit oval, or oblong, pointed, 1-4" long and 1-1½" in diameter; till ripe striated with white and green; when ripe red; seeds involved in a red pulp, lobed (p. 694).

Trichosanthes lobata, Roxb.—*Ban-chachinga*, *jangli-chichinda*.

Belonging to the same natural order as the preceding. Stems 5-sided, somewhat hairy, running to a great extent. Leaves petioled, 5-7 lobed; lobes obovate, scallop-toothed, of a soft downy texture; 6-7" each way. Tendrils 3-forked. Male flowers racemed, white. The female ones solitary and white also. Pomes linear oblong, smooth, ornamented lengthways, except near the base, with ten white streaks. Seeds each surrounded with its own proper gelatinous, bright-red nidus. Roxburgh, 694; Hooker, Fl. Ind., II., 610.

Roxburgh observes that this plant grows amongst hedges and bushes, and flowers during the wet season. The fruit is apparently never eaten, although it appears to be a useful species. Clarke considers it to be probably a variety of *T. cucimerina*, as suggested by Wight (Prod., 350).

Lagenaria vulgaris, Seringe; *Cucurbita lagenaria*, Linn. Bottle-gourd.—*Kaddu*, *lau*, *lauki*, the *lauka* and *tumri* (small variety) of Kumaon and *gol-kaddu* of Bijnor; *alava* (that which does not sink), Sanak.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Leaves often 6" diameter, softly pubescent on both surfaces, more or less 5-angular, or 5-lobed. Male peduncle often 6", female 1", calyx-tube ½", pubescent. Petals 1-2". Fruit often 1½ ft. In India usually bottle or dumb-bell shaped. Seeds ½ by ¾ and ¼" thick, with an impressed groove parallel to and near the margin. Hooker, Fl. Ind., II., 613; Drury (U. P.), 283; Roxburgh, 700.

The bottle gourd is extensively cultivated in these provinces and yields a somewhat insipid substitute for French beans. Lindley notes a case of sailors being poisoned from drinking beer from a flask made out of this gourd in a wild state, and observes that, like the potato and some gourds, its poisonous qualities are removed by cultivation. The bottles used by mendicants in India are made from it, hence the name, as well as a stringed instrument called a *sitar*, and buoys for swimming and supporting rafts. The pulp is eaten with vinegar or mixed with rice and meat, or the whole fruit is sliced and boiled. The pulp of the wild plant is also used in medicine (see *Drugs*) and has a bitter taste. (Birdwood, 170). It is considered cooling and useful in coughs. O'Shaughnessy says (Ben. Dis., 343). The whole plant is of musky scent, soft, downy, stem climbing, tendrils 3-4 cleft, leaves cordate, entire, downy, somewhat glaucous, with two glands at the base, flowers stellated, very spreading, clustered anthers with their connective covered by oblong, ovate, acute papillæ. Fruit downy, smooth, tapered into a long slender stalk above the

insertion of the calyx. It keeps well for three or four months if hung in the air. The *tumri* variety is not edible.

Luffa ægyptiaca, Mill.; *L. pentandra*, *racemosa* and *clavata* of Roxburgh; *L. parvula*, Gosa, *hederacea* and *satpatia* of Wallich; *L. acutangula*, W. et. A.; *L. cylindrica*, Naud.; *Momordica luffa*, Linn.—*Dhandhal*, *ghiya taroi* or *tori* (Kumaon).

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Extensively climbing, hairy. Tendrils 2-3 fld. Leaves 4" diam., uniform-orbicular, 5-angled or somewhat 5-lobed, dentate, usually scabrous, punctate on both surfaces, pubescent on the nerves beneath; petiole 2". Male peduncle 6". Flowers often approximate near the summit; pedicels short, each carrying a small ovate viscid entire bract sometimes obsolete. Petals $5\frac{1}{2}$ "-1" yellow, often with elevated hairy green veins. Stamens 5. Female flower solitary; peduncle 1-3". Fruit 5-12". Seeds $\frac{3}{4}$ by nearly $\frac{1}{4}$ " usually black, very narrowly winged, smooth or very sparingly tubercled. The pedicels are rarely elongated (*L. satpatia*, Wall); one example of Falconer's has the racemes compound. The fruit being the part eaten and attended to in cultivation is hence very variable: and no good character founded on it can be drawn between this species and *L. acutangula*. Hooker, Fl. Ind., II., 615; Drury. F. P., I, 459; Roxburgh, 698.

The fruit is eaten in curries and the plant may often be seen trailing over the roofs of huts in the plains. Cultivated. The wild variety has an intensely bitter taste.

Luffa acutangula, Roxb.; *Cucumis acutangulus*, Wall. Acute-angled cucumber.—*Taroi*, *kali taroi* or *tori*, *satpatiya* (Bundelkhañd), *torai* and occasionally *jajinga*.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. The fruit is elongate, 10-angled, not covered by spines or papilla. Stems several, slender, running to a great extent, but with fewer branches than other species; pretty smooth, 5-sided. Tendrils 3-cleft. Leaves as in *Cucumis sativus*, but less rough. Stipules axillary, solitary, cordate, with glandular marks on one side. Male flowers pretty large, yellow, on long, erect, axillary racemes; the pedicels have a glandular bract near the base, and are articulated a little above it. Female flowers rather larger, axillary, solitary, peduncled. Fruit clavate, obtuse, pretty smooth, 10-angled; angles sharp, but smooth, about a foot long, and 2-3" in diameter; when riped dry and replete with dry fibres. Seeds black, irregularly pitted. Roxburgh, 698; Hooker, Fl. Ind., II., 615; Drury (U. P.), 291.

The half-grown fruit is one of the best native vegetables we have in India; when peeled (for the skin is hard), boiled, and dressed with butter, pepper, and salt, it is palatable. It may be known by its 5-angled leaves and 10-angled fruit: used much in curries and dressed as a vegetable with clarified butter and spices. The root is used in medicine. Cultivated all over the provinces: *L. echinata*, Roxb., *bindál*, is found wild and the fruit is eaten as a vegetable: Hooker, l.c., 613; Roxburgh, 699; Drury, F. P., I, 459. *L. acutangula*, Var. *amara*, Roxb. (699)—*kerula*—is a violent cathartic and emetic, and its seeds when ripe are used for that purpose in native practice, and the juice of the young roasted fruit as a sedative in headaches. The fruit of this species is oblong, 10-angled, without spines or papillæ. *L. tenera* (*kharwa-taroi*) is also apparently a bitter variety of this species.

Benincasa cerifera, Savi ; *Cucurbita pepo*, Lour. ; *C. hispida*, Wall ; *C. farinosa*, Slumè ; *Gymnopetalum calyculatum*, Miq. White gourd melon.—*Petha*, *kondha*, *gol-kaddu* (Bundelkhand) ; the *bhunja* or *petha* or *kumhra* of Kumaon.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Root annual. Stem and branches numerous, &c., as in *C. melopepo*, but exceedingly hairy. Tendrils lateral, generally 3-cleft. The first or lower leaves angular, the exterior from 5 to 9-angled, all toothed, remarkably soft and downy, from 4 to 6" long, and about the same breadth. Petioles round, tapering, hairy. Stipules axillary, solitary. Male flowers axillary, solitary, peduncled, yellow, pretty large. Calyx, its segments obtusely pinnatifid. Female flowers, like the male, axillary, solitary, peduncled. Calyx as in the male. Fruit subcylindric, without the least elevation or depression of its surface, remarkably obtuse at both ends ; when young exceedingly hairy ; by the time it is ripe the hair is gone, and it is then of a whitish bloom colour, about 12 or 18" long, and from 8 to 10" in diameter. Seeds white, with tumid margins, somewhat 2 pointed. The young unripe pomes are universally eaten by the natives in their stews and curries. Roxburgh, 700 ; Hooker, Fl. Ind., II., 616 ; Drury (U. P.), 76.

Commonly cultivated in all districts, especially the northern ; the fruit ripens in the cold season, and is well known for its greenish-white, smooth, waxy appearance. Used for preserves and in making sherbet and the young unripe fruit in curries.

Momordica charantia, Linn. ; *M. humilis* and *muricata*, Wall. ; *M. senegalensis*, Lam. Hairy momordica.—*Karola*, *karela*, Var. *uchhiyya*, *susavi* (Sansk.)

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Leaves 1-3" in diameter ; orbicular, glabrous or slightly pubescent, cut nearly to the base into 5-7 narrow sinuate or subpinnatifid lobes. Male peduncle 2-4", slender, bract. Calyx-lobes ovate, acute. Petals $\frac{1}{2}$ ", yellow. Female peduncle 2-4", slender, bracteate near the base ; ovary fusiform, muricate. Fruit 1-3", rostrate. Seeds $\frac{1}{2}$ ", compressed, corrugate on the margin, somewhat sculptured. Hooker, Fl. Ind., II., 617 ; Roxburgh, 696 ; Drury (U. P.), 306.

There are many varieties of this plant having specific local names. One, the *bārah māsiya*, lasts the entire year. The two salient forms have the one an oblong fruit somewhat long, and the other a smaller fruit, more ovate and tubercled, and between them are numerous gradations. The fruit is bitter, but wholesome, and is eaten cooked in curries after having been steeped in water with a little salt. It is also cooked as a vegetable with clarified butter and spices, and keeps well for several months hung up in an airy place. The variety *M. muricata* occurs wild in Rohilkhand, and the fruit is eaten, either raw or cooked, under the name *kakora*. It is also cut and dried for sale in slices, which can then be easily recognised by their being in four parts with seeds in each.

Momordica balsamina, Linn.

Belongs to the same order as the preceding. Monœcious, glabrous or nearly so. Leaves 1½-3" in diameter, orbicular, palmately 3-5 lobed to about the middle ; lobes acutely lobulate, punctulate on both surfaces ; petiole $\frac{1}{2}$ -1½". Male peduncle, 1-3" ; bract very near the top of the male peduncle, orbicular, denticulate, variegated ; calyx-lobes ovate or oblong, acute ; petals $\frac{1}{2}$ ", yellowish, black at the base. Female peduncle short, less than $\frac{1}{2}$ ", ebracteate. Fruit ovoid, narrowed to both ends, smooth, 1-3", rostrate, red. Seeds $\frac{1}{2}$ " compressed, nearly smooth. Hooker, Fl. Ind., II., 617.

Grows wild, used in medicine occasionally in native practice and the young green fruit is pickled (Meerut). *M. mixta*, Roxb., also occurs in these provinces and is the *M. cochinchinensis*, Spreng, in Hooker, *ibid*, 618.

Momordica dioica, Roxb.; *M. balsamina*, *missionis*, *renigera*, *Hamiltoniana* and *Heyneana*, Wall.; *M. Wallichii*, Roem.; *M. subangulata*, Blume.—*Ghosal-phal*, *gol-kankra*.

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Leaves 2-4" long and broad, cordate, ovate, acute, entire, denticulate or more or less 3-5 lobed, glabrous, often punctate beneath; petiole 1-2". Male peduncle 2-6", bract large, cowl-like, embracing the expanded flower, glabrous, thin or (in *M. missionis*) thick soft pubescent; calyx-lobes oblong with a narrow termination, petals 1", full-yellow, the two 2-anthered filaments 2-fid halfway down. Female peduncles as long as the male, bract small, usually near the base. Fruit 1-3", ellipsoid, acute, without ribs. Seeds nearly $\frac{1}{4}$ ", many, compressed, broad-oblong, with a few well-marked corrugations on the margins, nearly smooth on the surface. The large succulent Lower Bengal form cannot well be confounded with any other, but both from the Deccan Peninsula and Panjab there is a much slenderer form, the males of which have been referred to *M. balsamina* (the intense spinousness of the young ovary prevents the female plants being mistaken). They usually have the leaves much less dissected, and *M. balsamina* almost invariably exhibits both male and female flowers on the same branch. *M. missionis*, Wall., is the slender form with a glabrous small bract to male flower. *M. renigera*, Wall., has a large woolly bract. *M. Heyneana*, Wall., has the leaves deeply 3-lobate. *M. Hamiltoniana*, Wall., has the bract foliaceous crumpled serrate. *M. balsamina*, Wall., is the typical *M. dioica*, Roxb. Thwaite's *M. dioica* β . *denudata* is altogether remote from *M. dioica*. Hooker, Fl. Ind., II., 617; Roxburgh, 696; Drury (U. P.), 306.

Wild. The young green fruit and tuberous roots are eaten as a vegetable.

Cucumis trigonus, Roxb.; *C. turbinatus* and *maderaspatanus*, Roxb.; *C. melo*, var. *agrestis*, Naudin; *C. pseudo-colocynthis*, Royle; *C. eriocarpus*, Boiss.—*Indrayan* (Bundelkhand), *jungli-indrayan* and *bislombhi* (bazzars).

A plant belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerineæ*. Root perennial, by which character alone it can be distinguished from *C. melo* according to Naudin, but the examples seen and collected in India are almost invariably less than one year old. Stem in the typical examples scabrid; tendrils short. Leaves 1-2" diam.; orbicular subpentangular, in the typical plant deeply palmate-lobed; lobes very scabrid and often narrow; in the more flaccid *C. pubescens* the hairs more scattered, the leaves entire, 5-angled, 5-lobed; petiole $\frac{1}{4}$ -1 $\frac{1}{2}$ ". Peduncles of males and females $\frac{1}{4}$ -1". Fruit sometimes with a few scattered hairs, often with 10 stripes. The plants marked by Indian botanists as *C. pubescens* are reduced to *C. trigonus* by Naudin in the Kew Herbarium. Kurz (in Journ. As. Soc., 1877, pt. II., 103) separates *C. trigonus* with solitary peduncles from *C. pubescens* with clustered peduncles, and makes the latter a variety of *C. melo*, Linn. *C. pubescens* of Thwaite's *Enum.* (C. P., 3534) has remarkably acute lobes to the leaves and resembles *C. Hardwickii*, but there is no note of the fruit. Hooker, Fl. Ind., II., 619; Roxburgh, 701.

It is chiefly used as a purgative in medicine. *C. pubescens*, the *kachri* and *ban-ghamak* of those provinces (Drury, U. P., 172), occurs wild, and is occasionally cultivated and eaten raw or cooked.

Cucumis melo. Linn.; *C. utilissimus*, Roxb.; *C. flexuosus*, Linn.; *C. maculatus*, Willd. *C. gurmia* and *C. chata*, Wall; *C. cicutrisatus*, Stocks. Melon.—*Kharbūza*, *kharbūja*, and includes the *kakri* (*C. utilissimus*).

An annual belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerinæ*. Stems scabrous; leaves orbicular reniform, 5-angular or lobed, lobes neither deep nor acute, scabrid on both surfaces and also often with short hairs; 3 inches in diameter; petiole 2". Petals $\frac{5}{8}$ "; female peduncle sometimes 2". Fruit spherical, ovoid elongate or contorted, glabrous, somewhat hairy, not spinous nor tuberculate. Hooker, Fl. Ind., II., 620: Drury (U. P.), 172. Roxburgh describes the *kakri* variety thus:—Stems exactly as in *C. sativus*, but not quite so extensive. Tendrils simple. Leaves broad, cordate, generally more or less 5-lobed; lobes rounded, toothletted; above pretty smooth, below scabrous, the largest generally about 6" each way. Floral leaves of the female flowers sessile and very small. Male flowers axillary, peduncled, crowded, but opening in succession. Female flowers axillary, peduncled, solitary, both sorts yellow, about 1"—1 $\frac{1}{4}$ " in diameter. Fruit fleshy, generally a very perfect oval; when young downy and clouded with lighter and darker green; when ripe, perfectly smooth, variegated with deeper and lighter yellow; from 4 to 6" long, and from 3 to 4" diameter. Roxburgh, 701.

Roxburgh adds: "This appears to me to be by far the most useful species of *Cucumis* that I know. When little more than one-half grown, they are oblong and a little downy; in this state they are pickled; when ripe they are about as large as an ostrich's egg, smooth and yellow; when cut they have much the flavor of the melon, and will keep good for several months, if carefully gathered without being bruised and hung up; they are also in this stage eaten raw and much used in curries by the natives. The seeds, like those of the other Cucurbitaceous fruits, contain much farinaceous matter blended with a large portion of mild oil. The natives dry and grind them into a meal, which they employ as an article of diet; they also express a mild oil from them which they use in food and burn in their lamps. Experience as well as analogy proves these seeds to be highly nourishing and well deserving of a more extensive culture than is bestowed on them at present." Roxburgh, 701; Drury (U. P.), 173; Trans. Agri. Hort. Cal., V., 9.

The powder of the toasted seeds mixed with sugar is said to be a powerful diuretic, and serviceable in promoting the passage of sand or gravel. *C. melo* is very extensively cultivated along the banks of all the great rivers. The fruit is considered to be refrigerant, but difficult of digestion. The seeds are used as a diuretic. A prized variety is that with reticulated rind and of a greenish (not yellow) colour. The *kakri* is considered cool and astringent and is given in cases of dyspepsia. The *kakri* will keep for several months if carefully hung up and gathered without being bruised. The seeds are ground into meal, and the oil expressed from them is said to be very nourishing. O'Shaugh. Ben. Dis., 343.

Cucumis sativus, Linn.; *C. muricatus*, Wall.; *C. Hardwickii*, Royle. Common cucumber.—*Akhira*, the *kakra* and *kakura* of Kumaon.

Cultivated throughout India, belonging to the natural order *Cucurbitaceæ* and sub-order *Cucumerinæ*. Leaves 3-5" in diameter, petiole 2-3"; leaves ovate, 5-angular or slightly lobed;

lobes acute, hispidulous on both surfaces and also often with soft hairs, petals $\frac{1}{2}$ ". Fruit glabrous, sometimes tuberculated, commonly cylindric elongate 12" by $1\frac{1}{2}$ ". Female peduncle sometimes 2". Young ovary muricate with rigid prickles. Hooker, Fl. Ind., II., 620 ; Drury (U. P.), 173 ; Roxburgh, 700.

The green fruit yields the common salad and when young is made into pickles. The juice is said to banish wood-lice and fish insects by strewing freshly cut slices in their haunts. The leaves boiled and mixed with cummin seed, roasted and powdered, are administered in throat affections. The seeds toasted and powdered and mixed with sugar are powerfully diuretic. There are two varieties, one—giving fruit in the rains, and the other giving fruit in the hot season.

The variety *C. Hardwickii*, Royle, is the *air-alu* of Kumaon and *pahāri-indrāyan* of the plains. *C. momordica*, Roxb., the *phūnt* or *tūri* of the plains and *kachra* (unripe) or *phūnt* (ripe) of the hills and submontane tract, appears to be also a mere variety of *C. sativus*, which it resembles in all respects, except that it is less scabrous and larger. It is cultivated in cotton or maize fields as a favourite food and good substitute for the common cucumber, and derives its vernacular name from the fruit bursting as it ripens. Roxburgh, 700 ; Drury (U. P.), 172. The fruit of this variety weighs from 4 to 8 lb, is very like the common cucumber, but larger, and when ripe tastes like the country melon.

Citrullus colocynthis, Schrod ; *Cucumis colocynthis*, Linn. Colocynth gourd.—*Indrāyan* and *mukhail* of the plains.

Belonging to the same natural order as the preceding. Whole plant scabrid. Leaves $2\frac{1}{2}$ " by scarcely 2" in the typical, wild, very scabrous form, larger in the cultivated forms approaching *C. vulgaris*, ovate, middle segment compound-pinnatifid ; petiole 1". Petals $\frac{1}{2}$ ", obovate, light yellow. Ovary villous. Fruit smooth, globose, rarely 3" in diameter, intensely bitter, variegated green and white. Seeds $\frac{1}{4}$ – $\frac{1}{2}$ ", not margined. Hooker, Fl. Ind., II., 620 ; Drury (U. P.), 135 ; Roxburgh, 700.

A commonly cultivated plant introduced and now apparently in many places wild ; grows luxuriantly along the Jumna. The fruit yields the true colocynth of commerce (see O'Shaughnessy, Ben. Dis., 344, and Pharm., 94). O'Shaughnessy's description may also be quoted here :—

" Stem prostrate, hispid, leaves cordate, ovate, many lobed, white, with hairs beneath, the lobes obtuse, petioles as long as the lamina, tendrils short, flowers axillary, solitary, stalked ; females with the tube of the calyx globose and somewhat hispid, the limb campanulate with narrow segments. Petals small, fruit globose, smooth, 6-celled, with very numerous seeds ; size of an orange, yellow when ripe, with a thin solid rind and a bitter white flesh. The seeds are oval, obtuse, compressed, smooth, of olive colour, about four lines long."

Citrullus vulgaris, Schrod. ; *Cucurbita citrullus*, Linn ; *cucumis citrullus*, D.C ; *Citrullus fistulosus*, Stocks. Water-melon.—*Tarbūja*, *tarbūza*, *hindūdāna*.

Belonging to the same order as the preceding. Leaves deeply divided or but moderately lobed, glabrous or somewhat hairy, hardly scabrid. Fruit often 10" in diameter, sometimes

much smaller.¹ Flowers large, yellowish. Hooker, Fl. Ind., II, 621; Drury (U. P.), 174; Roxburgh, 709.

Said to be annual, while *C. colocynthis* is perennial; but the distinction between the cultivated form of the latter and the divided-leaved forms of this plant is small. The bitter variety of the water-melon is the *C. amarus* of authors. The *C. fistulosus* of Stocks has thick stems, leaves sparingly lobed, and is plentifully supplied with long, somewhat hispid hairs. *C. vulgaris* is supposed to be the biblical melon, and is still used in Egypt as a medicine. The water-melons of the Jumna and Ganges in these provinces are celebrated all over India as refrigerants and a sherbet ingredient. They contain a pale tasteless juice which fills the white pulpy mass of the inside, and is much consumed whilst the fruit is in season in every district. The water-melon grows to an immense size in Agra and Allahabad. The seeds form an esteemed article of food in China (Gill's Travels). A variety known as *kāḷinda* is sown in June, chiefly in sugarcane, and ripens in October, (W.)

Cephalandra indica, Naudin; *Coccinia indica*, W. et A.; *Bryonia grandis*, Linn.; *B. palmata*, Wall.; *Momordica monadelpha*, Roxb.—*Bimba*, *kanderi-ki-bel*.

Belonging to the same natural order as the preceding. Leaves 2-4" in diameter, 5-angular, occasionally 3-lobed, papillose, scabrid; petiole 1". Male peduncle 1", jointed below the flower; calyx-lobes linear-oblong, corolla nearly an inch, lobes long-triangular. Female peduncle about $\frac{1}{2}$ ". Ovary smooth. Fruit 1-2" by $\frac{1}{2}$ -1"; bright scarlet or ribbed red. Hooker, Fl. Ind., II, 621; Drury (U. P.), 144; Roxburgh, 696.

Cultivated in the upper Duáb and Rohilkhand, wild in the hedges in Bundelkhand. The ripe fruit is eaten raw or cooked in curries. The leaves mixed with *ghi* are applied as a liniment to sores. The whole plant bruised and mixed with the oil of *Euphorbia nervifolia* and powdered cummin seed is administered by natives in special diseases.

Cucurbita maxima, Duchesne. Common gourd.—*Kaddu*, *mīṭha kaddu*, *gadwa* (Kumaon), *soj hari kumhra*, (Bengal) *lāl-kumhra*.

An annual belonging to the same natural order as the preceding. Leaves 4-6" diameter, hispidulous, and also with much soft hair, with 5 shallow lobes or sub-entire sinus between the lobes narrow; hairs of the petiole equal, not pungent; petiole often nearly as long as the blade. Calyx-segments lanceolate-linear. Fruiting peduncle, stout, corky, striated, not grooved. Male peduncle 4"; female $1\frac{1}{2}$ ". Corolla, 3-4". Hooker, Fl. Ind., II, 622; Drury (U. P.), 175.

A large species cultivated in both hills and plains: grows very rapidly, sending out long feelers; fruit tastes like a carrot. Grown in Europe for feeding cattle; eaten baked in England, boiled in India. Seeds yield an oil used for food and burning. Birdwood, 158; Aitch. 64.

Cucurbita moschata, Duchesne: *C. maxima*, W. et A.; *C. melopepo*, Roxb.; *C. camolenga*, Wall. Musk melon.—*Kharbaj*; *saphari kumhra* (in places).

Belonging to the same order as the preceding. Hairs of the petiole equal not pungent, calyx-segments, spatulate or foliaceous. Hooker, *ibid*, 622; Roxburgh, 700.

The fruit is roundish, smooth, torulose, and comprises several cultivated varieties. *C. lobata* (?) is the *tendús* of Bijnor and *tendu* of the Duáb, very extensively cultivated for its fruit; a great favourite and esteemed highly palatable and nutritious.

Cucurbita pepo, D. C. Pumpkin or white gourd.—*Kumhra*, *kumara*, *kadmah*, *petha* (in places), *konda*, the *lauka* and *kaddu safed* of Bijnor.

Belonging to the same order as the preceding. Leaves 4-6" in diameter with much soft hair, hispidulous, on the nerves beneath 5-lobed sinus between the lobes broad, denticulate, lobes acute, often slightly lobed. Hairs on the petiole beneath rigid, almost prickly; petiole often nearly as long as the blade. Fruiting peduncle, woody, strongly grooved. Male peduncle 4" or more; female 1½". Corolla 3-4". Hooker, Fl. Ind., II., 622; Roxburgh, 700.

Cultivated throughout the hills and plains. The fruit is cool and stomachic. A sherbet is made by filling the hollow centre with sugar and exposing it to the sun until it becomes acid (see *Drugs*). The seeds of this, like those of other gourds, yield an oil by expression, used as a cooling medicine, also for culinary purposes and burning.

Bryonia laciniosa, Linn.; *Bryonopsis erythrocarpa*, Naudin; *B. courtallensis*, Arn.—*Carga naru*.

Belongs to the same natural order as the preceding. Stems angular, slender, usually glabrous or nearly so. Leaves often scabrous, punctate above, lobes 2-3 inches, with a broad or narrow sinus; petiole often longer than the blade, sometimes mucronate near the apex. Male pedicels less than 1 inch, usually glabrous; female still shorter. Calyx-teeth subulate. Fruit ½" diameter, green with white vertical stripes. Seeds ¼". Hooker, Fl. Ind., II., 623; Drury (U.P.), 87; Roxburgh 703.

Used chiefly in medicine, though considered edible; wild in Kumaon and Bundelkhand. The seeds yield a medicinal oil. *Rynchocarpa fatida*, Schrod., the *B. pilosa* of Roxburgh (703) and *B. rostrata* of Rottler, the *kanduri* of these provinces, occurs wild in Rohilkhand, where the young green leaves are eaten cooked.

Mukia scabrella, Arn.; *M. Maderaspatana*, Kurz.; *Bryonia scabrella*, Linn. f.; *Cucumis maderaspatanus*, Linn.; *Trichosanthes dioica*, Wallich.—*Bilári*, *agu marki*, *gwala-hokri* (Kumaon);

Belonging to the same order as the preceding. Stem angular, slender, hispid or scabrid. Leaves rough; hispid beneath, 1-3", serrate; petiole often very short, sometimes one inch or more. Flowers ½-¾" in diameter. Ovary very hispid. Fruit ¾-1" diameter, bright red; seeds rough on their faces. Hooker, Fl. Ind., II., 623; Drury (U.P.), 88; Roxburgh, 702.

Found wild everywhere in Bundelkhand (E.), Moradabad (T.), Dehra Dún (K.), Kumaon (M.). The seeds in decoction are sudorific, and the root in decoction is useful in flatulence, and masticated relieves toothache. Not cultivated, and only used in medicine.

Ctenolepis Garcini, Naudin; *Zehneria Garcini*, Stocks; *Bryonia Garcini*, D. C.

Belonging to the same order as the preceding. Annual, stem not elongate, more or less scabrous and punctate, scarcely at all hairy. Leaves 1-1½" in diameter; middle lobe of the leaf not very acute nor much longer than the others; lobes often sinuate and lobed; petiole ½-¾";

stipuliform bracts $\frac{1}{2}$ " and more, elliptic with long cilia. Peduncle less than $\frac{1}{4}$ ". Fruit not longer than broad; $\frac{1}{2}$ by $\frac{1}{4}$ ". Hooker, Fl. Ind., II., 630; Roxburgh, 703.

Occurs wild in Bundelkhand; fruit, seeds, and root are used in medicine. *Zehneria umbellata*, Thw., and its variety *Nepalensis* occur wild in Kumaon. Hooker, II., 625; Edge.; Aitch., 515.

B.—Vegetables (Cultivated.)

Brassica campestris.	Salvia plebeia.
" rapa.	Leucas aspera.
Lepidium sativum.	Batatas edulis.
Raphanus sativus.	Lycopersicon esculentum.
Hibiscus esculentus.	Physalis Peruviana.
" sabbdariffa.	Solanum tuberosum.
Oxalis corniculata.	" esculentum.
Trigonella fœnum-græcum.	Beta vulgaris.
Canavalia ensiformis.	" Bengalensis.
Arachis hypogæa.	Spinacia oleracea.
Trapa bispinosa.	Dioscorea alata.
Apium graveolens.	" globosa.
Daucus carota.	Ananassa sativa.
Cynara scolymus.	Allium cepa.
Helianthus tuberosa.	Jamipha manihot.
Lactuca sativa.	Amorphophallus campanulatus.
Mentha silvestris.	Clocasia Himalensis.
" viridis.	Maranta arundinacea.

b.—Vegetables.¹

Brassica campestris, Linn. Swedish turnip.—*Wilayuti shalgam*.

Only occasionally cultivated. Hooker, Fl. Ind., I., 156.

Brassica rapa, Linn. Turnip.—*Shalgam*, *salgam*, the *chankan* of the Bhotiya parganas of Kumaon.

This species has begun to form a portion of the products of native gardens, though Brahmans and Baniyas have an objection to it, as they say that it, as well as onions, garlic, and carrots, have some fancied resemblance to flesh, which is a forbidden food. Both cabbage and turnips are boiled in water and then pressed and dressed with *ghi* and spices. Sown from June to February. Hooker, l.c., 156; Roxburgh, 497.

Lepidium sativum, Linn. Cress.—*Halim*.

Grown for native and European use as a salad. Hooker, l.c., 159; Roxburgh, 497. See *Greens*.

Raphanus sativus, Linn. Radish.—*Mûli*.

Two ordinary varieties are cultivated in gardens, var. *radicula*, the long radish, and var. *oblonga*, the turnip-shaped radish, cooked in the same manner

¹ Many of these cultivated vegetables are too well known to require a description here, and I shall, therefore, only give a description of the less known local plants.

as turnips. The fruit (*sengra*) is boiled in water only and eaten with a little clarified butter or *ghi* and the unripe seed pods are pickled. Sown from the commencement of the rains until February for successive crops, either broadcast or on ridges. *R. caudatus*, the variety with whip-like pods, is growing in favour and is eaten as a salad. Hooker, Fl. Ind., I., 166; Roxburgh, 500.

MALVACEÆ OR MALLOW-WORTS.

Hibiscus esculentus, Linn.; *H. longifolius*, Roxb.; *Abelmoschus esculentus*, W. et A.—*Bhindi*.

A tall herb belonging to the natural order *Malvaceæ* and sub-order *Hibisceæ*. Annual, hairy, not prickly. Leaves cordate, 3-5 lobed; lobes, oblong, toothed, scabrous; petiole 6", more or less bristly. Stipules subulate; peduncle shorter than the petiole, about 1". Bracteoles 1" in diameter, linear-subulate; 8-10, deciduous, equalling the calyx, capsule pyramidal. Flowers yellow, with a crimson centre. Staminal-tube anthiferous throughout. Fruit 6-10" by 1", pyramidal-oblong, glabrescent, cells 5-8 seeded. Seeds striate, hairy, variable. Hooker, Fl. Ind., I., 343; Drury (U. P.), 1; Roxburgh, 529.

The capsules known as *rām-taroi*, *dhenrūs*, or sometimes simply as *bhindi* or *blinda taroi* or *tori*, are consumed in large quantities boiled as a vegetable. Split open and half-dried they keep for a considerable time, and are used by Europeans for thickening soups. When young they may be pickled like capers. (See, further, *Drugs* and *Fibres*). The seeds may be separated and used as a substitute for pearl barley or to flavour coffee or laid on toasted bread. The name *rām-taroi* is sometimes applied to the fruit of *Luffa acutangula*. The whole plant is replete with a mild nourishing mucilage, especially useful as a demulcent (see *Drugs*). Dr. Roxburgh makes the Indian variety *H. longifolius*, Wall., and restricts the name *H. esculentus* to the West Indian species (528).

Hibiscus sabdariffa, Linn.; *H. sanguinus*, Griff. Roselle, red sorrel.—*Patwa*.

Belonging to the same natural order as the preceding. Annual, glabrous, unarmed, stem purplish. Leaves entire or lobed, midrib glandular beneath; petiole 2". Peduncles very short, thickened at the summit, solitary, axillary. Bracteoles 8-12 linear and calyx accrescent. Sepals bristly, deltoid, acuminate, connate below the middle into a purple fleshy cup. Corolla 2½" in diameter, yellow. Capsule ovoid, pointed villous, shorter than the calyx. Seeds reniform, sub-glabrous. Hooker, Fl. Ind., I., 340; Drury (U. P.), 252.

Well known from its pale sulphur flowers and its dark crimson capsules which yield the Indian substitute for red currant jelly known as *patwa*. A decoction of these makes a cool refreshing drink, and the leaves are used in salads. See *Fibres*.

H. rosa-sinensis, Linn., is also cultivated for pickling, as well as *H. tricuspis*, Banks; *H. mutabilis*, Linn., and *H. syriacus*, Linn.: see Hooker, *ibid*, 314 Roxburgh, 522-5.

Oxalis corniculata, Linn.; Procrembent oxalis.—*Amrul*, *amlīka*, *ambuti*.

The leaves are eaten as a salad. Hooker, *ibid*, 436; Roxburgh, 389; Drury (U. P.), 335. See *Greens*.

Trigonella fœnum græcum, Linn. Fenugreek.—*Methi, mûthi*.

Forms a vegetable ingredient in curries. Hooker, Fl. Ind., II., 57; Roxburgh, 588. See *Greens*.

Canavalia ensiformis, D. C.; *C. gladiata*, D. C.; *Dolichos ensiformis*, Linn Bean.—*Sen*.

Of this bean there are several varieties, with seeds and flowers of different sizes and colours and known by different vernacular names. The variety with large white seeds and flowers is cultivated in both European and native gardens, and is highly esteemed. The young legumes are eaten as a vegetable and cooked in water only, a little *ghi* being seldom added. The specific name is derived from the shape of the large flat sword-shaped pods, some of which are fully eighteen inches long and one and a half inch broad. Hooker, Fl. Ind., II., 195; Drury (U. P.), 105; Roxburgh, 559.

Arachis hypogæa, Linn.; *A. Africana*, Tourn.; *A. Asiatica*, Lour. Earth-nut.—*Mungphali; wilâyati-mung, chñu-badām*.

Belonging to the natural order *Leguminosæ*. Annual, diffuse, stem hairy: leaves abruptly pinnated; leaflets 2 pair: calyx tubular, long; corolla papilionaceous; stamens and petals inserted into the throat of the calyx; flowers above ground staminate, aggregate, axillary yellow: legumes long-stalked, indehiscent, celled, 3-3 seeded. Drury (U.P.), 43; Roxburgh, 552.

Cultivated in all parts of the plains for its pods, which bury themselves in the earth and there ripen their seeds. The plant flowers in June, and the nuts are eaten by the poorer classes raw or roasted, and also yield an oil used for culinary purposes and as a lamp-oil. From experiment it has been shown that an ounce of the earth-nut oil in a lamp having a wick of $\frac{1}{8}$ th of an inch in diameter will burn 9 hours and 25 minutes; whilst a similar quantity of olive oil under the same conditions will last only 8 hours and give a less brilliant light. It does not give out smoke, nor does it rapidly become rancid by keeping. It is extensively exported to France to adulterate or imitate olive oil, but is only cultivated occasionally in these provinces. The attention of those interested in promoting the development of the resources of these provinces is now drawn to this apparently highly useful plant.

Trapa bispinosa, Roxb.; *T. quadrispinosa*, Wall.—*Singhda*, water caltrop.

A plant belonging to the natural order *Onagraceæ* and sub-order *Trapa*. Root consisting of numerous, simple, capillary fibres which issue from the under margins of the cicatrices of the fallen leaves. Stems stoloniferous, often several feet long, floating. Leaves petioled, alternate, approximate round the apex of the shoots, of a rhomboidal-reniform shape: with the posterior margins entire, and the anterior ones serrate dentate, smooth above, a deep green, villous and purple underneath, 3-4" broad, and nearly as long. Petioles villous, lengthening with the age of the leaves, towards the apex much smaller; this part contains many inflated vesicles, which render the whole plant very buoyant. Stipules two pair, the superior one simple, semi-lanceolate and caducous, the inferior pair at first simple and filiform, but becoming ramous by age, permanent. Peduncles axillary, solitary, shorter than the petioles, one-flowered, incurved

until the blossoms begin to decay, after which they bend down under the surface of the water, where the fruit grows, and comes to maturity. Flowers pure white, expanding above the surface of the water late in the afternoon. Calyx 4-leaved, in opposite pairs, leaflets lanceolate, villous, one of the pairs permanent. Corol contracted. Petals four, contracted into a tube at the base by the firmness of the calyx, above much broader, and expanding; margins much curled. Nectary cup-shaped, on the top of the germ, round the swelled base of the style, eight-grooved, with the margins minutely lacerate and curled. Filaments four, incurved. Anthers oval, incumbent. Germ inferior, obconical, 2-celled, with one ovulum in each attached to the top of the partition. Nut inferior, of a turbinate triangular shape, a hard ligneous texture, and a blackish brown colour, armed with two strong, straight, conic, barbed spines from the upper angles; elegantly embossed, 1-celled, not opening, but having a perforation in the top for the embryo to pass, which is guarded with a circle of stiff converging bristles from its margin, forming a conical root over the aperture. Seed single, conform to the nut. Integument single, of a slightly brown colour, thin but rather tough, and adhering firmly to the perisperm. Perisperm conform to the seed, white and of a firm cartilaginous texture. Embryo in the apex of the perisperm. This is evidently a species perfectly distinct from *natans* and *bicornis*. From the former it differs in having only two horns, and from the latter in the horns being straight, very sharp and barbed. The nuts are sold in the markets when in season, their kernels being much esteemed by the Hindus. Roxburgh, 144; Hooker, Fl. Ind., II, 590; Drury (U. P.), 437; Sleeman's Rambles.

It is cultivated as a favorite food resource in the tanks and fresh-water reservoirs of these provinces and is in great request during fasts, being one of the *phalāhas* or fruits lawful for Hindus to eat during those seasons. It is eaten both raw and cooked and is also grated into a flour which, coloured red with *kamila*, is thrown about at the *holi* festival. The *singhāra* is cultivated chiefly by Dhīnars and Kabārs, who have spaces regularly marked out by bambus, for which they pay rent to the landholder. The long stalks reach the surface of the water, on which float the green leaves, and amongst them the white flowers expand their petals towards evening. In the end of January the seed or fruit is scattered, at the rate of a *maund* of 82lb. to a local *bigha*, over the water where it is sufficiently deep, to preclude all chance of its drying up before the advent of the periodical rains. The seeds are then pressed into the mud with sticks or the feet, and in a month they begin to throw out shoots. In June, just before the rains set in, the excess is thinned out and transplanted, the produce of one *bigha* serving for three or four: the roots are taken between the great and first toes of the planter's foot and thus fixed in the mud. The long stalks of the plant reach up to the surface of the water, on which the bright-green leaves float, supporting in the middle a pure white flower. In October the nut forms under the water; it is of a triangular shape, covered with a rough brown integument, adhering strongly to the kernel and armed with spines: hence the name. The kernel is white and esculent and of a fine cartilaginous texture. The fruit is gathered in November and December. In Hamīrpur, in the Mahoba pargana, a local *bigha*, measured by bambus 18 feet long, of which 12 by 2 make the *singhāra bigha*, yields three to four maunds of produce worth about two to four

rupees a maund. The rent is about one to three rupees a bigha, kankar in the soil being esteemed unfavorable and rich mud fetching the highest rent. The Dhimars of Hamirpur generally take the lease of a lake at a fixed rent and divide it among themselves, their respective cultivations being marked by upright sticks, the removal of which, as of boundary marks on shore, leads to many a quarrel. Their great enemy is an insect called *bandu*, which in both stages of grub and fly feeds on the plant, eating through the husks, and thus destroying the fruit, which on being exposed to the water spoils. The labour of killing these and clearing away weeds is very great. In Cawnpore a kind of raft is made by joining two earthen vessels together by a bambu, astrido which or resting his arms on which the kahár paddles about to clear off the insects. For the cultivation flat-bottomed canoes are used, scooped out of the trunk of a single mahwa tree, costing about five rupees each to make, and lasting fifteen to twenty years. They carry two men and are pushed on by bambus; and when not used are sunk in the water till again wanted. The cultivation of this fruit forms one of the most important sources of the miscellaneous revenue in villages.

Carica papaya, Linn.; *Papaya vulgaris*, Linn.; *P. carica*, Gaertn. Common papau—*Papaya*; *papeya*; *arand-kharbúza* or castor melon.

Tree 20-30 feet, without branches: leaves alternate, palmate, 7-partite: segments oblong, acute, sinuated, the middle one 3-fid: fruit succulent, oblong, furrowed: calyx small 5-toothed: corolla tubular in the male and 5-lobed in the female, divided nearly to the base into 5 segments: male flowers axillary in slightly compound racemes or panicles white, female ones in short simple racemes, sometimes on a different tree: corolla longer than in the male, yellowish. Drury (U. P.), 113: Roxburgh, 736: Brandis, 244.

An American tree, introduced by the Portuguese, cultivated in gardens in these provinces for its fruit, which is used as a vegetable. On the west coast of Africa the rich close odour emitted by the flowers is said to be the cause of much sickness. The acid milky juice of the fruit is highly anthelmintic. Vauquelin compares it to a substance strongly animalized—to the blood of animals. It is said to have the extraordinary property of hastening the decay of muscular fibre when the latter is exposed to its influence. In Barbadoes the flesh of animals hung on its branches is said to become soft, though Dr. John Davy declares that this is due to incidental circumstances rather than to any special power possessed by the *papaya* (*Edin. N. Ph. J.*, Oct., 1855). Major Drury notes that “in order to render meat tender, either flesh or fowl, the simplest operation is to hang the flesh under the tree for two or three hours, which is quite sufficient. It has repeatedly been tried and can be testified to. Another way is to wrap the meat in the leaves and then to roast it. In a tropical climate like India, where meat requires to be cooked quickly, in order to provide against rapid decomposition (on which account it is often found very

tough), there should be one of these trees in every garden. Wight mentions (*III*, II, 36) that the farmers in the Isle of Barbadoes mix the milky juice with water and give it to horses in order (to use their expression) 'to break down the blood:' and this is a remarkable fact that the effects of this dissolving power in the fruit is not confined to muscular fibre, but acts on the circulating blood. This tree has, besides, several valuable medicinal properties. The milky juice is among the best vermifuges known. A single dose is sufficient for the cure. The natives in Travancore repeatedly use it for children. In the West Indies the powder of the seeds is used for the same purpose. The juice of the pulp of the fruit is used to destroy freckles on the skin caused by the sun's heat, and the negroes employ the leaves to wash linen instead of soap. The natives in this country both pickle and preserve the fruit for their curries. Even in a raw state it is very palatable." The small black seeds have the taste of water-cress, and the fruit before ripening makes a good tart.

Umbelliferae.

Apium graveolens, Linn. Celery—*Saleri*, *kurafs* (seeds), and *Pteroselinum sativum*, Willd. Parsley; the *persaleri* of gardeners.

These are seldom cultivated by natives. Hooker, *Fl. Ind.*, II.; 679; Roxburgh, 273.

Daucus carota, Linn. Carrot—*Gajar*, *ardak*.

This root has been much cultivated of late years both as a garden and field crop in these Provinces. The root is first boiled in water, then squeezed out and cooked in *ghi*. Brahmans and Baniyas do not eat the carrot, as they say it has a resemblance to flesh, which is forbidden them. Hooker, *Fl. Ind.*, II., 718; Roxburgh, 270. The parsnip (*Pastinaca sativa*) is very seldom cultivated even in European gardens.

Cynara scolymus, Willd. Garden-artichoke—*A'tichuk*, *harshaf*.

Is grown only in European gardens. Belongs to the natural order *Compositae*. Roxburgh, 595. *C. cardunculus*, the cardoon, is occasionally grown in European gardens.

Helianthus tuberosus, W. Jerusalem artichoke—*A'tipich*.

Is slowly making its way amongst natives. Belongs to the natural order *Compositae*.

Lactuca sativa, D.C. Lettuce—*Salad*, *kahu*.

Is only grown for European tables. Belongs to the natural order *Compositae*, Roxburgh, 593. *Cichorium endivia*, the endive, is also only grown for European tables.

Mentha silvestris, Linn. Mint—*Padina*.

Belongs to the natural order *Labiatae*. Roxburgh, 460.

The following herbs are cultivated for native kitchens :—

Mentha viridis, Linn. Spearmint—*Pahāri-padma*.

Belongs to the natural order *Labiata*.

Salvia plebeia, R. Br. Sage—*Salba*, *khāi-tulsi*. Drury, F. P., II., 552.

Belongs to the natural order *Labiata*.

Dysophylla verticillata, Benth.—*Pani kala*.

Known by its purple flowers and woolly stems. Drury, F. P., II., 516.

Leucas aspera, Spreng.—*Chhota halkasa*.

Belongs to the natural order *Labiata*.

Batatas edulis, Choisy ; *Convolvulus batatas*, Michx. ; *C. esculentus*, Spreng. ; *C. edulis*, Thunb. *Ipomœa batatas*, Lam. Sweet potato—*Shahr-kand*, *rukt-ālu*, *pind ālu*.

Belonging to the natural order *Convolvulaceæ*. Stem creeping, rarely twining : leaves variable, usually angular, also lobed, cordate : sepals 5 : corolla campanulate : peduncles equal in length to the petioles, 3-4 flowered : flowers white outside, purple inside. Drury (U.P.), 70 ; Roxburgh, 162.

Cultivated all over the provinces. There are two principal varieties, one with white and the other with red tubers, both of which are highly esteemed as palatable and nutritious articles of food when boiled or roasted. The young leaves and tender shoots are eaten in curries and used as greens, and the leaves themselves are considered an excellent fodder for cattle.

Lycopersicon esculentum, Don. Love-apple, tomato—*Wilāyati baigan*.

The well-known introduced species now cultivated by all classes. Roxburgh, 190.

Physalis peruviana, Willd. ; *P. edulis*, Sims ; *P. pubescens*. Cape gooseberry—*Tipāri*, *tipāriya*.

Belonging to the natural order *Solanaceæ*. Biennial or perennial, very ramous, diffuse, pubescent. Leaves double, or single, and then with a branchlet : cordate, dentate. Flowers solitary, drooping. Stigma 2 cleft. Roxburgh, 189.

Cultivated on account of its yellowish berries, about the size of a gooseberry, from which the famed *Tipāri* jam is made. Although naturally perennial, the plants are raised from seed every year, as they are, like the capsicums and the many varieties of egg-plant, not fruitful after the first year.

Solanum tuberosum, Linn. Potato—*Ālu*.

The potato flourishes well in the hills at Naini Tāl, Almora, Pāori, Lohughāt, and beyond Masuri, and also in the plains. The potatoes grown in the hills undoubtedly attain a larger size and have a better flavour, but, owing to frequent sowing of the same seed in the same places, have of late become waxy and watery. To remedy this, a large quantity of new seed has been imported from England to renew the stock. The average price of hill potatoes in the season at Masuri is 4d. to 5d. a stone of 14lb., of the plains variety in the plains 2d. to 3d. Drill cultivation is that usually adopted, and in favorable

years it is a profitable crop. A very pure starch resembling arrowroot is readily obtainable from the rasped tubercles by the usual process of washing with cold water. This starch is easily convertible into sugar and alcohol by fermentation and yields the potato whisky of Europe.

Solanum esculentum, *S. melongena*, Linn Egg-plant—*Brinjal*, *baigan*; the *baigan* and *bhutta* of Kumaun.

Belonging to the natural order *Solanaceæ*. Perennial. Stem clothed with stellate tomentum; leaves ovate, unequal at the base, angularly sinuated, downy; flowering peduncles solitary, reflexed; calyx prickly, campanulate; segments linear lanceolate; corolla violaceous, 6-9 cleft, marked by a yellow star inside. Fruit oval, smooth. Flowers nearly all the year. Don's Mill. IV., 432; Drury (U. P.), 409.

There are two principal varieties :—

Var. 1. *melongena*, Linn., Roxb.; *S. ovigerum*, Dun.; *S. pseudo-undatum*, Blume. Stems, leaves and calyces unarmed or nearly so; flowers largish, violet. Roxburgh (190) describes it as having leaves obliquely-ovate, downy, scolloped. Fertile flowers solitary, long-peduncled, drooping; the barren ones on small racemes. Fruit oval, smooth; the *nara-baigan* or *máru*.

Var. 2. *longum*, Roxb.; *S. esculentum*, Dun.; *S. insanum*, Linn., Willd. (not Roxb.). Stem, leaves; and calyces more or less aculeate; the *baliya-baigan* or *baliya*. Roxburgh (190) describes it as being clearly distinct from his *melongena*, for the fruit is always cylindrical, never changing by culture into any other form. The plant is biennial, and in every respect like *melongena*, the fruit excepted. The cold season is the proper time for rearing it. The plants will exist for several years, but are either dug up or neglected after the first year.

Stem short, erect, somewhat woody. Branches numerous, spreading, 2-forked, downy, sometimes prickly; the whole plant 2-3 feet high. Leaves alternate petioled, oblong, scolloped, or sub-lobate, downy; 6-10" long; sometimes the principal nerve is prickly on the under side. Flowers bowing, large, of a beautiful, bright bluish-purple; they are of two kinds, abortive with a minute pistil on a small raceme or umbellet; and a single fertile one upon its own proper petiole, which generally stands immediately below or close by the peduncle of the racemes. Calyx and petioles sometimes prickly. Berry pendulous, cylindric, generally a little curved, but never in the least clubbed, smooth, yellow; from 9 to 18" long, and from $1\frac{1}{2}$ to $2\frac{1}{4}$ " in diameter; it is generally three-celled. Roxburgh, 190.

The fruit of each of these varieties is either (a) ovate-oblong or oblong, purplish or greenish white, (b) globular, purplish, or (c) more or less globular, greenish-white or white striped on a purplish ground. In a poor soil the leaves have many prickles, in a rich soil few.

The egg-plant is cultivated all over these provinces, even in the hills in favourable localities. It occupies the ground nearly the whole year, and is easily affected by frost though it quickly recovers. It is eaten either boiled or half-boiled, sliced and fried in *ghí* in curries. For medicinal uses see *Drugs*. *S. rubrum*, the *gorkhi-baigan*, grows wild over the lower districts.

Beta vulgaris, Linn. Beet—*Chaukandar*.

This root belongs to the natural order *Chenopodiaceæ* and is eaten as a salad and vegetable. It is almost confined to European gardens, except near large towns, and attains to great perfection in size and flavour. The variety,

Beta Bengalensis, Roxb., *Palak, palang*, has :—

Root ramcus, annual. Stem erect, ramous, furrowed, smooth, pale green, the whole 2-3 feet high. Leaves alternate, the lowermost large, petioles, trowel-shaped, and running down the petioles, smooth, succulent, with waved margins; the superior or floral leaves small, sessile, incurved, nearly lanceolate, and with curled margins. Spikes very long. Flowers rather remote, always in pairs. Calyx; leaflets equal, without teeth, or process of any kind; margins membranaceous. Filaments inserted into a ring round the flower. Styles 2-4, short. Roxburgh, 261.

The root of this variety is not eaten; the leaves are boiled as a vegetable and have the flavour of spinach. The leaves shoot again after plucking, and thus afford a constant supply.

Spinacia oleracea, W. Spinach—*Palak, isfanaj*.

Cultivated chiefly by Europeans in India. *S. tetandra* is known as *gojawa* and occurs wild; it is used as a spinach. Roxburgh, 718.

Dioscorea alata, Linn. Wing-stalked yam—*Khám alu*.

Belonging to the natural order *Dioscoreæ*. Tubers oblong, brown on the surface, internally white, in a rich soil of great size, which perish after having produced that of the succeeding year. Besides the tubers, the proper roots of all these plants are fibrous, springing chiefly from, and about, the union of the stems with the tubers, and spreading in every direction. Stems herbaceous, twining over trees and bushes to a very great extent, somewhat four-sided, each angle enlarged with a copious, membranaceous, curled wing, otherwise smooth, often prickly toward the base. Leaves generally opposite; that is, the first only that appears on the young shoots being alternate; all long petioled, deeply cordate, with the lobes protruding much, more or less rounded and approximated, 5-7 nerved, ensiform, pointed, smooth on both sides, various in size. Petioles nearly as long as the leaves, 5-winged, enlarged at the base, coloured, and stem-clasping. *Male*:—Spikes compound, or panicled. *Female*:—Spikes axillary, compound, and simple, smooth. Bracts 3-fold, 1 flowered. Flowers remote, small, and green. Roxburgh, 727; Drury (U. P.), 193, and F. P., III, 274.

Flowers early in the rains and forms a favourite vegetable for curries and is also eaten alone: cultivated throughout the lower districts in the plains.

Dioscorea globosa, Roxb. Globose yam—*Chúpri alu*.

Belonging to the same natural order as the preceding. Root tuberous, roundish, often very large; internally very white. Stems herbaceous, twining, of great extent, about 6-sided, with the angles membrane-winged, and prickly toward the root. Leaves opposite and alternate, long-petioled, broad, sagitate-cordate, ensiform, pointed, waved, smooth, from 5 to 7 nerved. Petioles 5 winged, nearly as long as the leaves. *Male*:—Spikes axillary, simple and compound; the compound ones very long, pendulous, and sub-verticelled. Flowers small, very numerous. *Female*:—Spikes axillary, simple, erect, with a few remote, very fragrant flowers. Roxburgh, 727; Drury (U. P.), 194.

This is the most esteemed of the cultivated varieties. Flowers in the middle of the rains. The tubers are large, roundish, white inside, the skin thin

and smooth like a potato, and when baked are pleasant even to European tastes. The fruit is also edible.

Other cultivated species are :—

1. *D. rubella*, Roxburgh (727) : tubers oblong, deeply tinged with red immediately under the skin, but this colour does not penetrate deep, sometimes as much as three feet long in a deep rich soil ; *guraniya dlu* of Bengal.

2. *D. purpurea*, Roxburgh (727) : tubers oblong, throughout of a lighter or darker purple, but always considerably deep in the tinge : the *lāl-guraniya dlu* of Bengal.

3. *D. fasciculata*, Roxburgh (728) : tubers many, about the size of a hen's egg, connected by slender filaments to the base of the stems, covered with a fairly smooth, light-coloured, thin integument : internally white : the *sūsni dlu* of Bengal.

Ananassa sativa, Schultz. Pine apple—*Anāṇās* :

Grows luxuriantly in the Pilibhit sub-division of the Bareilly district and in Gorakhpur. In both places it partakes more of the nature of a field than a garden crop.

Asparagus officinalis, W. Asparagus—*Hilyān, nāgdān*.

Cultivated as a vegetable chiefly in European gardens.

Allium cepa, W., Onion—*Ptyāj*.

Is one of the most commonly cultivated garden plants all through these Provinces. It is eaten both cooked and raw, and forms an ingredient in almost every dish. Brahmans and Baniyas object to eating it from some fancied resemblance to flesh, which is forbidden them.

A. schænoprasum, W., Chives—*wildiyati bhang-i-gandana*—and *A. porrum*, W., Leek—*gandana puru*—are both known to Indian gardeners and are used to flavour curries. *A. ascalonicum*, W., Shallot, is propagated by dividing the roots, and gives a crop during the cold weather. *A. scorodoprasum*, rocambole, and *A. fistulosum*, ciboul, are also occasionally cultivated in European gardens. The former produces bulbs like garlic on the top of the stem, the latter is the Welsh onion and has no bulbs. *Chærophyllum bulbosum*, the tuberous, rooted chervil, and *Scandix cerefolium*, the chervil, are also occasionally cultivated in European gardens.

Janipha manihot, Kunth. Tapioca.

Belonging to the natural order *Euphorbiaceæ* ; grows luxuriantly in these Provinces ; described in *Journ. Agri.-Hort. Soc., Cal., VII., 243*, where the following information as to propagation and manufacture is given :—

Planted in light sandy soil five feet apart. The roots are gathered, washed, stripped of the rind, then ground to a pulp, which is thrown into a clean cloth,

and the acrid poisonous juice well wrung out. The pulp thus partially deprived of its impurity is exposed for a few hours to the influence of the sun, by which any remaining juice is successfully taken up. The mass is next mixed with clean water (much in the manner of arrowroot), strained, and the pulp thrown away. The milky substance thus obtained is allowed to settle, when the clear water is carefully drawn off, and the subsidence again and again watered until it becomes perfectly firm and white; it is then put in the sun until quite dry, crushed and passed through a muslin sieve. To use this powder, it is only necessary to mix up a tablespoonful with cold water into a paste, then pour boiling water, stirring it all the while, and put it on the fire for three minutes, when it will become a fine transparent jelly, whereas the tapioca in grains requires a very long time to dissolve by boiling. For medicinal properties, &c., see O'Shaughnessy (*Ben. Disp.*, 559).

The following is another mode of extracting the powder from the tapioca roots practised in Bengal. The roots are first washed and stripped of the rind, then ground to a pulp, which is thrown into a clean cloth, and the acrid poisonous juice well wrung out. The pulp thus partially deprived of its impurity is exposed for a few hours to the influence of the sun, by which any remaining juice is successfully taken up. The mass is next mixed with clean water, strained, and the pulp thrown away. The milky substance thus obtained is allowed to settle, when the clear water is carefully drawn off, and the subsidence again and again watered until it becomes perfectly firm and white; it is then put in the sun until quite dry, crushed, and passed through a muslin sieve.

Amorphophallus campanulatus, Blume; *Arum campanulatum*, Roxb.; *Candarium Roxburghii*, Schott.—*Zamin-kand*; *kānda*, *mondha*, *nāg-phani-kund*.

Belonging to the natural order *Aroidæ* and sub-order *Dracunculeæ*. Root perennial, tuberous, roundish, covered with a dark brown skin, frequently, when in a good soil, as large as a child's head; from various parts of the chief root there issue small tuberosities which are employed as offsets to cultivate the plant by. Leaves radical, for the most part only one or two, 3-bifid; divisions outwardly pinnatifid; segments obliquely oblong, pointed, smooth; size very unequal, the exterior one being always longer than the inferior one; the whole leaf is 1-3 feet each way. Petiole round, tapering, with darker coloured green, pretty smooth, clouded as long as the leaves. Spathe very large, leathery, campanulate; the border curled; smooth on both sides; the outside near the base pale green; the middle part deeper green, and towards the margin greenish purple; the bottom deep dotted purple; the spadix about as long as the spathe, the lower third or pistilliferous part cylindric; the middle third or staminaliferous portions somewhat turbinate, the club or upper third part very broad, short, conical, or sub-globular, of a dark purple colour, variously lobate, and wrinkled like a dried truffle; in large plants this part is 6" in diameter and 4" in perpendicular height. Filaments none. Anthers numerous, closely impacted round the turbinate or middle portion of the spadix, linear, 2-celled, with two corresponding openings at the apex at which to discharge the disk or pollen; the immense quantity thereof that spews out from these openings and drops down in the pistils is really inconceivable. Nectarial filaments none. Geras numerous, roundish; styles

ubulate, thick-coloured; stigmas large, yellow, downy, 2-lobed. Berries numerous, long, obovate, red and covered with a considerable portion of pulp. Seeds, one or two in each berry. Roxburgh, 629; Drury (U.P.), 31, and F. P., III., 485.

This species is much cultivated in the Northern Circars, and highly esteemed for the wholesomeness and nourishing quality of the roots. It deserves to be called the Telinga potato. The usual time of cultivation is immediately after the first rains in June. A very rich loose soil suits it best, where the swelling of the root meets with little obstruction, and where they draw the greatest nourishment, for which reason it requires to be very well and repeatedly ploughed. The small tuberousities that are found in the larger roots are what they employ for sets, and are planted in the manner potatoes are in England and about the same distance from one another. In twelve months they are reckoned fit to be taken up for use. The larger roots will then weigh, if the soil has been good and the season favourable, from four to eight or more pounds each; they keep well if they are kept dry, and are by the natives employed as food in the same manner as the common yam. It is also cultivated along the foot of the hills and in most districts of these provinces and ripens after the other rain roots, being the only one that keeps well in the ground. A little *ajwain* seed added in cooking prevents the disorder of the digestion which the use of these roots alone is said sometimes to cause.

Colocasia antiquorum, Schott.; *Arum colocasia*, Linn.; *A. ægyptiacum*, Rumph.—*Kachu*, *kach-ala*, *gagli*, *ghuiya*, *arwi* (Benares, Banda).

Belonging to the natural order *Aroideæ* and sub-order *Caladieæ*. Stemless; leaves peltate, ovate, repand, semibifid at the base; scape shorter than the petioles; spathe much longer than the spadix, cylindric, erect; club sub-cylindrical, the length of the anthiferous part of the receptacle; anthers many celled. Roxburgh, 624; Drury (U.P.), 155, and F. P., III., 488.

There are two varieties cultivated here, planted at the beginning of the rains and gathered in October-November.

There are three wild varieties noticed by Roxburgh;—

1. The *kála* or dark-coloured *kachu* found on the edges of ditches and other wet places. The leaves and the petioles are more or less tinged with purple, and the roots never swell in the manner the cultivated varieties do, but send out numerous runners. The leaves and their foot-stalks are the parts chiefly eaten by the natives of Bengal.

2. *Chár-kachu* grows on dry ground, chiefly by roadsides, on dunghills and among rubbish; it differs from the other varieties in having the disk of the leaves marked with dark-purple or bluish-black clouds.

3. *Ban-kachu*. In situation and form every way like the last, but of a uniform green colour. The last two are rarely eaten by the natives of Bengal where better vegetables are plentiful and easily procured.

The wild varieties are called *jangli-ghuiya* or *ghuiya*, *rulkiya* and *gúr-páphar* in Kumaon. The *arwi* is widely cultivated everywhere and especially as a garden crop in the neighbourhood of large towns from the hills to Gházipur. The large bright green leaves shooting up from the bulb are a marked feature in the landscape during the rains. The tuber of the cultivated variety is long, white, carrot-shaped, often weighing several pounds and forms an important article of food among the lower classes where quantity and not quality is a desideratum. It is usually served fried in *ghi* or boiled and pounded into a paste and also in curries. There are varieties that are very small, hardly weighing more than quarter of a pound.

Colocasia Himalensis, Royle.—*Guiya* (plains); *pindálu* (white); *gaderi* (red), *pápar* (leaf), *guba* (unrolled leaf), Kumaon.

Tubers and leaves edible.

Maranta arundinacea, Linn. Arrowroot.

Belonging to the natural order *Marantææ*. This root has been successfully cultivated in these provinces. The tubers are ready for digging in January and should be scraped and well washed before being powdered in order to remove the acrid poisonous juice. An ordinary piece of tin punched with holes makes a good grater. After being washed the powder should be dried in the sun before being stored. The arrowroot produced from these tubers at Haldwái, near Naini Tál, by Mr. Fraser has been pronounced by experts both here and in Europe to be equal to the best West Indian arrowroot.

C.—Condiments and spices.

<i>Nigella sativa</i> .	<i>Pimpinella anisum</i> .
<i>Papaver somniferum</i> .	<i>Capsicum frutescens</i> .
<i>Pencedanum graveolens</i> .	<i>Chavica betle</i> .
<i>Murraya Koénigii</i> .	<i>Cinnamomum tamala</i> .
<i>Carum carui</i> .	<i>Piper silvaticum</i> .
„ <i>Roxburghianum</i> .	<i>Curcuma longa</i> .
„ <i>copticum</i> .	<i>Zingiber officinale</i> .
<i>Coriandrum sativum</i> .	<i>Amomum subulatum</i> .
<i>Cuminum cyminum</i> .	<i>Allium sativum</i> .
<i>Feniculum vulgare</i> .	<i>Areca catechu</i> .

There is no country in the world, perhaps, where spices and condiments enter so largely into the food materials of the population. The man must be very poor indeed who cannot afford something of this kind with his daily meals. Much, however, of the spices consumed are imported into these provinces, such as mace, cloves, black pepper, assafoetida, Ceylon cinnamon, nutmegs, most of which are noted for their medicinal properties under Drugs and need not be mentioned here. The *Cinnamomum tamala*—*toj* of Kumaon—yields the *taj* bark of the

lazars, the Indian substitute for cinnamon, and the leaves (*tojpat* or *tejpat*) form an important ingredient in curries. From the Himálaya we also have turmeric (*haldi*), ginger (*adrak*), cummin (*zira safed*), and cardamoms (*iláchi*); while in the plains large quantities of chillies (*lál mirch*), fennel (*sonf*), coriander (*dhaniya*), lovage (*ajwáin*), safflower (*kusum*), used as a substitute for saffron, garlic (*lahsan*), poppy seed (*khash-khash*), black cummin (*kála zira*), and dill (*soya*) are produced. Nearly all these are used with everything eaten and more largely with meat. In curries and *pillaus* they are the principal ingredients. The municipal statistics of 61 towns, with a population of 1,882,617 souls, show an annual consumption per head of spices and drugs valued at Re. 1-2-4, or 2s. 3½d. A very small portion of this sum is due to drugs and perfumes, and it is probably within the mark to say that the urban population of these provinces consume not less than two shillings worth of spices per head per annum. Taking the consumption of the rural classes at even one-third the city consumption, the total annual consumption in these provinces will amount to £124,986 sterling. These figures show the great economical importance of this class of food materials.

As remarked by Dr. Stewart, "there is no doubt that the free use of these spices is from their carminative and stimulant effect indicated, when the food is so largely made up of non-stimulant and fibrous or crude vegetable substances—the former tending to sluggishness and the latter to indigestion,—as is that of the natives, although, doubtless, the gratification of the palate has much to do with their liberal consumption."

Salt, though not forming a portion of the cultivated products, must be mentioned here as it enters so largely into the condiments used by the people of these provinces. It is chiefly procured from the Sambhar lake in Rajputána and in the upper districts of the hills from Tibet.

Amongst the various combinations of spices and the like that are manufactured as relishes to be taken with food the principal are *khatái* or *dál khatái*, *dohár* or pickles and *chatni* (Stewart).

The *khatái* is usually manufactured from the mango. There are many ways of preparing it; the most common is where the unripe mango is cut in two and the stone removed and replaced by spices such as fennel, cummin, and small pieces of ginger. The pieces are then tied together and put aside with a little salt and mustard-oil. Again, the green skin of the fruit is only removed and the spices placed in the hollow of the stone. A third method is to dry the stone and grind it up into meal with spices, turmeric, and a little vinegar. *Khatái* is sometimes made from ginger saturated in vinegar and allowed to dry; when used a little sugarcane juice is added.

Achr or pickles are prepared with vinegar (*sirkah*)-only, or with oil (*tel*), or without either. The vinegar is made from the sugarcane by simply allowing it to undergo the acetous fermentation.

The fruits usually pickled with vinegar are ripe mangoes, plantains, *karaunda*, *karela*, radishes, turnips, carrots, the berries (*tent*) of the *karl*, the *kamrak*, *kamranga*, and *tum*, all of which are noticed elsewhere. These last in pickle for about a year and are consumed in immense quantities. The tender shoots of the bambu are also occasionally pickled and the fruit of the horse-radish tree (*sahijna-ka-phal*). Limes, tamarinds, and unripe mangoes are often pickled whole after having been salted for a few days previously. Green ginger (*sonth*) and onions are treated in the same way, and in fact most of the pickles procurable in India are also made in these provinces. A favourite and excellent pickle is obtained by splitting up mangoes, removing the kernel, and stuffing the inside with spices and covering the whole in mustard-oil. Limes and tamarinds are treated in the same way and will keep for a long time.

The young pods of several cultivated plants are dried with spices and treated as condiments, but never last very long.

Chatnis are principally made from mangoes, tamarinds, *karaunda*, *kait*, *baigan*, unripe plantains, *tili* seed, &c., mixed with other condiments. *Khatdi* of various kinds may be turned into chatni by adding salt, vinegar, and spices.¹

Nigella sativa, Linn. Small fennel;—*Kala jira*.

Belonging to the natural order *Ranunculaceæ*. The stem is erect, 1-2 feet high, many flowered, downy. Leaves capillary, cut into numerous fine segments. Petioles downy; flowers naked, dirty white; anthers, ovate, obtuse; capsules mucicated, united up to the point into an ovate fruit, terminated by fine erect styles. The seeds, resembling coarse gunpowder, are triangular, slightly compressed, obtuse above with oblique bases, rugose, black externally, internally of a greenish white hue. The capsules are polyspermous, oblong, and pointed at the side. Roxburgh, Fl. Ind., 450.

Cultivated in most districts, especially in Bundelkhand, for its seed: the black cummin of Scripture and according to Birdwood, the *melanthion* of Hippocrates and Disocorides and *gith* of Pliny. (See *Drugs*.)

Papaver somniferum, Linn. Opium, poppy.—*Afim*.

Belonging to the natural order *Papaveraceæ*. See *Narcotics*. The seeds (*khash-khash*) are used in curries.

Peucedanum graveolens, Benth. ; *P. sowa*, Kurz ; *Anethum graveolens*, Linn. ; *A. sowa*, Roxb. Indian dill.—*Sowa*, *soya*.

Belonging to the natural order *Umbelliferae* and sub-order *Peucedaneæ*. Glabrous, 1-3 feet. Leaves 2-3 pinnate. Pedicels many, $\frac{1}{4}$ ". Styles small. Dorsal and intermediate ridges distinct,

¹ See Riddell's Indian Domestic Economy, Madras, 1860, for a good account of native confections.

slender; vittæ large, solitary in each furrow, 2 on the commissure. The fruits are as broad and as much winged in the Indian *P. sowa* as in the ordinary *P. graveolens*; never sub-obsolete, as shown in Wight Ic. t. 572. In the European *P. graveolens* the carpels are plano-convex, and not so sub-pentagonal as depicted by Reichenbach, as Bentham has observed l. c. Hooker, Fl. Ind., II., 709; Roxburgh, 272; Pharm., 101; Drury (U. P.), 39.

Cultivated for the seeds, which form one of the principal ingredients in curries and also yield a medicinal oil. (See *Drugs*.) Cultivated in most districts. According to Birdwood, the *anêthon* of Theophrastus and Dioscorides.

Murraya Kœnigii, Spreng.; *Bergera Kœnigii*, Linn.—*Gândla*, *gandela*, *gânt*, *gani*, *bowala*, *hari*, *kath-nin* (Oudh).

Belonging to the natural order *Rutaceæ* and sub-order *Auranticeæ*. A small strong-smelling umbrageous tree, pubescent or tomentose, rarely glabrous, deciduous. Leaves often one foot long, narrow, petiole slender, terete leaflets petioled, 1-1½" variable, usually obliquely ovate, obtusely acuminate, tip notched, crenulate, sometimes sub-orbicular or lanceolate. Corymbs peduncled, many-flowered. Flowers white, ½" long, sub-campanulate, ebracteate. Sepals acute. Petals linear-oblong, obtuse dotted. Stamens alternately longer, filaments dilated below. Ovary 2-celled: style cylindric, stigma capitate grooved, ovules solitary in each cell, or 2-superposed. Fruit ovoid or sub-globose ½" diam., black, rugose. Seeds imbedded in mucilage. Hooker, Fl. Ind., I, 503; Brandis, 48; Roxburgh, 362; Drury (U. P.), 79.

The leaves are extensively used as a flavoring ingredient in curries, and for this purpose are dried and sold in most bazars. The seeds yield a clear yellow oil known as Simboli oil. (See *Drugs*.)

Carum carui, Linn.—Caraway.—*Jira*.

Belonging to the natural order *Umbelliferae* and sub-order *Ammineæ*. Glabrous. Stem 1-3 feet, branched, erect, or diffuse. Leaves 2-pinnate, finely dissected, ultimate segments of the lower leaves lanceolate, ½-¾" of the upper linear ¼-1". Bracts 1-3, small, linear, or O. rarely divided; rays 3-8, ½-2" unequal; pedicels 3-8, ¼-½" unequal. Fruit elliptic oblong, ½-¾" yellowish-brown, almost viscid; carpels terete narrowed upwards, primary ridges thin, but very distinct, vittæ solitary, rather large, carpophore entire, or shortly 2-fid. *C. meifolium*, Bieb., differs by its lower leaves with linear segments, its more numerous bracts; but is perhaps hardly distinguishable. Hooker, Fl. Ind., II., 680; Pharm., 98.

Cultivated in Garhiwâl, where it is also found wild. Fruit usually separating into two parts, which are about two lines long, curved, tapering at each end, brown with five-paler longitudinal ridges; having an agreeable, aromatic odour and a spicy taste. Active principle, a volatile oil. According to Birdwood, the *karos* of Dioscorides and *careum* of Pliny, both names being derived from Caria, the native home of the plant.

Carum Roxburghianum, Benth.; *Apium involucratum*, Roxb.; *Pimpinella* (?) *involucrata*, W. et A.; *Athamantha Roxburghiana*, Wall.; *Ptychotis Roxburghiana*, D. C.—*Ajmûd*; *radhani* (variety).

Belonging to the same natural order as the preceding. Probably a cultivated form of *C. stictocarpum*, which it exactly resembles except as to the fruit which is 1½-2" the part used by man, and therefore that which has varied under cultivation. This shows a wide difference in size, colour, and hairiness in the two forms, but there is a series of connecting

links through the var. *hebecarpa*. In *C. Roxburghianum* the fruit is more distinctly ridged, subpentagonal; the vittæ are most minute. Wight and Arnott say several in each furrow, but they appear generally 1 or 0. The petals are hairy. Wight doubts whether his t. 567 (which is copied from Roxburgh) is the *Pimpinella* (?) *involuta* of W. and A., Prodr., 369, but a reference to his Herbarium shows that it is; the fruit varying somewhat in size and a good deal in hairiness. Hooker, Fl. Ind., II, 682; Roxburgh, 273.

Cultivated largely throughout these Provinces for its seed, which is used in curries.

Carum copticum, Benth.; *Ligusticum ajardin*, Flem.; *L. ajowan*, Roxb.; *Ptychotis coptica* and *P. ajowan*, D. C., *Bunium aromaticum*, Linn.; *Seseli ammoides*, Jacq. Lavage.—*Ajardin*, *javdni*.

Belonging to the same order as the preceding. Minutely pubescent, or the stem and leaves glabrescent. Root fusiform, stem 1-3 feet erect, branched, leafy. Leaves 2-3 pinnate; ultimate segments linear, often $\frac{1}{2}$ -1 inch. Bracts several, linear, rarely 0, sometimes divided; rays 4-12, $\frac{1}{2}$ -1"; pedicels 6-16, $\frac{3}{8}$ -1" more or less pubescent. Fruit $\frac{1}{4}$ " ovoid; carpels subpentagonous, dorsally compressed, nearly plane on the inner face; ridges usually distinct; vittæ solitary, small. The bracts are in the Indian ajowan not rarely divided, when it is undistinguishable from the West Asian *C. copticum*. Boissier maintains that the genus should be *Ammi*, because the petals are destitute of a transverse fold; but W. and A. are correct in saying (Prodr., 368) that they are just like those of other *Carums*. Hooker, Fl. Ind., II, 682. Roxburgh's description of the Bengal variety is as follows:—

Ajardin, H. Root annual, stem erect, one to three feet high, branches alternate, smooth, slightly striated, leaves scattered, those nearest the root supra-decompound, the upper less so, all with filiform divisions. Umbels terminal, erect, composed of from six to eight rays, on rather unequal peduncles, partial, of many rays on unequal pedicels, involucre both universal and partial of from five to eight linear unequal branches shorter than the umbels, petals pure white, equal, furrowed on the back and keeled within with involute points, and broad waved rather reflexed margins; fruit didymous, compressed, broad, ovate, with fine scabrous ridges on each side, of aromatic smell and warm pungent taste. Fl. Ind., 2; Pharm. 99; Drury (U. P.), 370.

Extensively cultivated in gardens for the seed which is sown after the rains. The seeds have an aromatic odour and a warm pungent taste and are much used for curries and culinary purposes generally.

Coriandrum sativum, Linn.; *Cuminum cyminum*, Wall (not Roxb.) Coriander.—*Dhaniya*.

Belonging to the natural order *Umbellifera* and sub-order *Diplozygia*. A herb, annual, branched, glabrous. Leaves decompound. Umbels compound, rays few; bracts 0, or small linear; bracteoles few, filiform. Calyx-teeth small, acute, often unequal. Petals obovate; emarginate, white or purplish, of the outer flowers unequal, often radiant. Fruit sub-globose; ridges not prominent, dorsal primary and adjacent secondary strongest, lateral primary and secondary obscure; vittæ obscure, solitary, under the secondary ridges; carpels slightly concave on the inner face, commissure distinctly 2. Vittæ 2; carpophore 2, partite. Seed convex-concave, about thrice as broad as thick. Hooker, Fl. Ind., II, 717; Pharm. 101; Drury (U. P.), 162; Roxburgh, 272.

The seeds form one of the principal ingredients in curries. They are carminative and have a highly aromatic odour and are used in liqueurs, sweetmeats,

and for culinary purposes generally. The seeds also yield a volatile aromatic oil used in medicinal preparations. See *Drugs*.

Cuminum cyminum, Linn. Cummin.—*Jtra*, *ztra-safed*: the cummin of the Bible.

Belonging to the same order as the preceding. A slender, annual herb, glabrous except the fruit. Leaves twice or thrice 3 partite, ultimate segments filiform. Umbels compound, rays few; bracts and bracteoles several, linear, rigid. Calyx-teeth small, subulate, unequal. Petals oblong or obovate, emarginate, white, often unequal. Fruit cylindric, tip narrowed; primary ridges filiform, distinct; secondary usually hispidulous; vittæ large, solitary under each secondary ridge; carpophore 2-partite or 2-fid. Seed somewhat dorsally compressed, convexo-concave. Hooker, Fl Ind., II., 717; Roxburgh, 721.

Appears wild in the hills 7-9,000 feet, and cultivated in the plains. There are two varieties, the black (*sigâh*) and white (*safed*). The fruit is much used as a condiment and has a warm bitterish taste due to the presence of a volatile oil. Both the fruit and the oil are used in medicine. See *Drugs*. According to Birdwood it is the *kuminon hémeron* and *aithiopikon* (Hip.) of the Greeks and *cuminum* of the Romans.

Fœniculum vulgare, Gærtn.; *F. officinale*, Boiss.; *F. dulce*, C. Bauh.; *F. panmorium*, D. C; *Anethum fœniculum*, Linn.; *A. panmorium*, Roxb. Indian fennel.—*Sonf*, *panmahuri*, *mayari*.

Belonging to the natural order *Umbelliferae* and sub-order *Seselinæ*. Root white, nearly fusiform, and almost simple. Stem erect, ramous, from the base to the top, the branches also erect, round and smooth, with a uniform, pale, glaucous tinge, and not striated as in dill and sowa, the general height of the whole plant from 2 to 4 feet. Leaves alternate, scattered, supra-decompound, divisions round, tapering, smooth and filiform, but by no means so numerous as in *F. vulgare*, which this plant resembles. Umbels terminal, rather concave, but not regular, the convex, from ten to thirty-flowered umbellets, of which there are generally from ten to twenty, standing on peduncles of very unequal lengths. Flowers small, bright, deep yellow. Petals long, ovate, with their apices rolled in. Stamens longer than the petals. Germ oblong. Styles scarcely any. Roxburgh, 272; Hooker, Fl Ind., II., 695.

There does not appear to be any real difference between *F. vulgare* and *A. panmorium*, Roxb., to which the above description properly belongs. Fennel is sown in beds and rows and cultivated for its seed as a field and garden crop in the plains and hills. The seeds form an important ingredient in curries.

Pimpinella anisum, Linn. Anise.—*Anisun*, *mahori*, *sauraf*.

Belonging to the natural order *Umbelliferae*. Fruit ovate, 1½ lines long, dull brown, slightly downy, not at all shining, with the ridges equidistant, elevated, sometimes rather wavy, paler than the channels, commissure broad and flat.

Very sparsely cultivated in gardens for the seed, which is used in medicine and as a condiment. According to Birdwood it is the *anison* of the Greeks.

Capsicum fastigiatum, Blume; *C. annum*, Linn., Red pepper.—*Lâl-mirch*, *gachh-mirch*, *mircha*.

A small plant belonging to the natural order *Solanaceæ*. Reaches 1-2 feet high; stem herbaceous; calyx 5 toothed; corolla 5-cleft; leaves solitary, scattered, entire; peduncles extra axillary, 1-flowered; fruit oblong, pendulous or erect, red, yellow or variegated. Flowers white, all the year. Don's Mill., IV., 444.

There are several species cultivated in India, and they are thus separated by Roxburgh (193) :—

(1.) *C. annuum*, L. Shrubby; leaves ovate-lanceolate; peduncles solitary; flowers drooping; fruit oblong, reflex. *Gachh-mirch*. Introduced, cultivated.

(2.) *C. grossum*, W. Shrubby; leaves ovate-oblong; peduncles solitary, 1-flowered, drooping; fruit reflex, swollen into different shapes. The bell-pepper or *kāfri-mircha*. The thick, fleshy skin is but slightly acrid. Cultivated.

(3.) *C. frutescens*, L. Shrubby; leaves ovate-lanceolate; peduncles solitary; flowers drooping; fruit tapering, curved reflex. The chilly pepper; or *gachh-mirch* (red and yellow) or simply *lāl-mirch*. Cultivated largely in the hills.

(4.) *C. minimum*, R. Shrubby; leaves ovate-cordate; peduncles in pairs; flowers drooping; calyces with subulate, spreading teeth; fruit sub-cylindric, erect. The Indian bird's-eye chilly; *dhan lanka-mirch*, *dhan-mirch*. Introduced from the Phillipines.

C. baccatum, Linn., yields the ordinary bird's-eye chilly, and *C. Nepálensis*, the small Nepál variety so much approved of.

C. frutescens is the species most commonly cultivated in the hills of these provinces for export. There are two varieties, the red and yellow or orange, both known as *kursāni* in Kumaon, *lāl-mircha* in the upper districts, and *lanka-mircha* in the south. It is from this species that the ordinary Cayenne pepper, commonly used in India, is made.

Besides the above Roxburgh mentions *C. purpureum*, Roxb., and *C. cerasiforme*, Willd. Introduced species and other indigenous species are *C. pyramidale*, Mill; *C. conoides* Mill; *C. angustifolium*, D. C.; *C. longum*, D. C.; *C. cordiforme*, Mill; and *C. tetragonum*, Mill. A close examination will doubtless reduce the number of species and help us to ascertain whether any of them are really indigenous to India. Birdwood (239) notes that the greatest doubt is entertained of the common capsicum being a native of Asia, but Sprengel says that it is without doubt the *piperitis* and *siliquastrum* of Pliny. It is first mentioned with *C. baccatum* and *C. grossum* by Fuschius. *C. frutescens* is first described by Monardes, and Fraas considers the *peperi apomékes* of Theophrastus to refer to *C. longum*. The word *kapsikon*, the origin of the common term *capsicum*, first occurs in Actuarius. Chili is the Mexican term for all varieties of capsicum. Chillies, green and ripe, aid the digestion and are used with salads, in curries, and in almost every dish. For its medicinal uses see *Pharm.* 180. It is also used to flavour vinegar for cooking,

and for this purpose the vinegar is first heated, and thus preserves the essential qualities of the pod. Cayenne pepper is prepared in the following manner in the West Indies. The ripe fruits are dried in the sun, and then in an oven after bread is baked, in an earthen or stone pot, with flour between the strata of pods. When quite dry, they are cleaned from the flour and beaten or ground to fine powder. To every ounce of this a pound of wheat flour is added, and it is made into small cakes with leaven; these are baked again, that they may be as dry and hard as biscuit, and then are beaten into powder and sifted. It is then fit for use as a pepper, or for being packed in a compressed state, and so as to exclude air, for exportation.

Chavica betle, Miq; *Piper betle*, Linn. Betel-leaf pepper.—*Pán*.

Belonging to the natural order *Piperaceæ*. Shrubby, scandent, rooting, branches striated; leaves membranaceous, or the adult ones coriaceous shining above, glabrous on both sides, the inferior ones ovate, broadly cordate, equal-sided; slightly unequally cordate, or rounded at the base, 5-6-nerved; catkins peduncled: male ones long, slender, patulous or deflexed; female deflexed, shorter, long peduncled. Roxburgh, 53; Drury (U. P.), 130. Pharm. 208.

Roxburgh observes that the plants are constantly raised from the slips and cuttings; these are carefully planted in a rich moist soil, well inclosed and shaded, so that they are in great measure protected from both sun and wind. In some places, small plantations of *Aeschynomene grandiflora* are made to train them to and to keep off the sun; in others poles are employed for the first, and a thin shed of mats over them for the latter purpose: they require to be frequently watered during the dry weather. The leaves are chewed by natives mixed with the nut of the areca palm (*súpári*) which is a powerful expectorant and anti-sudorific. *Pán* cultivation is extensively pursued in these Provinces, and the variety grown in Bundelkhand is celebrated over Upper India. Betel cultivation requires considerable care and labour and is conducted in these Provinces by Barehs or Tamolis, the betel garden being known as *bareh-ja* in Bundelkhand. The garden is enclosed on all sides by matting attached to poles which are also thickly studded within to support the plants.

Piper sylvaticum, L. *P. longum* Linn.; *Chavica Roxburghii*, Miq. Long pepper.—*Pípala-mor*, *pípala-múl*, mag.

Belonging to the natural order *Piperaceæ*. Stem somewhat shrubby, the sterile ones decumbent, the floriferous ones ascending, dichotomously branched, at first slightly downy, afterwards glabrous: inferior leaves long petioled, ovate, roundish, broadly cordate, acute or obtuse, 7-nerved, upper ones short petioled; top ones sessile, embracing the stems, oblong, unequally cordate, 5-nerved, all thick, membranaceous; petioles and nerves beneath, especially near the base, finely downy, afterwards glabrous: male catkins filiform cylindrical, with the peduncle as long as the leaves; female ones thicker, less than half that length, about the length of the peduncle. Roxburgh, 52; Drury (U. P.), 131: Pharm. 208.

Common in the Bhábar and valleys of Kumaon; cultivated in the plains. Roxburgh thus describes the cultivation in Bengal. The long pepper is not

propagated by seed, but by suckers, and requires to be cultivated upon a rich, high, and dry soil. The suckers are transplanted soon after the setting in of the periodical rains, and the pepper (which is preserved merely by drying it in the sun) is gathered in the month of January, after which the stalk and branches of the plant wither, and the roots only remain alive. A bigha of land (the third of an English acre) will yield in the first year about a maund (84lb) of the pepper; in the second year four maunds; and in the third, six, after which, as the plant becomes annually less and less productive, the roots are grubbed up, dried, and sold, and fresh roots or young shoots are set in their stead, the earth requiring merely a slight covering of manure. The plants are never to be watered, and at the commencement of the hot season the roots are to be carefully covered with straw to preserve them against the heat of the sun. The plants should be set about 5 feet asunder.

Cinnamomum tamala, Nees; *C. albiflorum*, Nees; *Laurus tamala*, Ham.; *L. cassia*, Roxb. Hill cinnamon—*Jangli-dalchini*, *kikra*, *kirkiriya*, *sinkami*, *silkauti*, *taj*, *taj-kalmi* (bark), *tajpat* (leaf).

A tree belonging to the natural order *Lauraceæ*. A handsome, moderate-sized tree; young twigs 4-sided, greenish grey, glabrous, smooth. Leaves sub-coriaceous, opposite or sub-opposite, rarely alternate, elliptic-oblong, from an acute base acuminate, 3-6" long, glabrous, shining, the midrib dividing some distance (up to $\frac{1}{4}$ ") above the base into three longitudinal nerves, joined by distinct reticulate veins. Flowers whitish, numerous, in axillary and terminal pubescent panicles, pedicels as long as the calyx. Calyx silky-pubescent, lobes membranaceous, with 3-7 distinct longitudinal nerves, ovate-oblong, obtuse, separating in a transverse line above the base, but below the middle, and falling off after flowering. Berry black when ripe, succulent, ovoid, $\frac{1}{4}$ " longitudinal, supported by the 5-lobed somewhat thickened base of the calyx. Brandis, 374; Roxburgh, 337; Pharm, 169.

Common in the Himálaya of these Provinces 3=7,000 feet. Flowers February-March and on to May: fruit ripens during the rains. The leaves are used as a flavouring agent in curries and the bark in native medicine as a substitute for cinnamon.

Curcuma longa, Roxb.; *Amomum curcuma*, Gmel. Turmeric—*Haldi*, *haladi*, *pitras*, *sard-chob*.

Belonging to the natural order *Zingiberaceæ*. Leaves long-petioled, broad-lanceolar, of a uniform green; bulbs small and with the numerous, long palmate tubers inwardly of a deep orange yellow. Flowers large, whitish with a faint tinge of yellow, the tuft greenish white. Roxb., 11; Drury (U. P.), 177.

Flowers from July to September. A very important crop in the lower hills, "also grown in the plains. König thus describes its cultivation in Bengal:—The ground must be rich, friable, and so high as not to be overflowed during the rainy season, such as the Bengalis about Calcutta call *danga*. It is often planted on land where sugarcane grew the preceding year, and is deemed a meliorating crop. The soil must be well ploughed and cleared of weeds, &c.

It is then raised in April and May, according as the rains begin to fall, into ridges, 9 or 10 inches high and 18 or 20 broad, with intervening trenches 9 or 10 inches broad. The cuttings or sets, viz., small portions of the fresh root, are planted on the tops of the ridges, at about 18 inches or two feet asunder. One acre requires about from nine hundred such sets, and yields in December and January about two thousand pounds weight of the fresh root."

It is largely cultivated in Kumaon, Garhwál, and parts of Dehra Dún, and forms one of the most important and profitable articles of export from the lower hills. It is grown in jungles where nothing else can be raised, as well as in the open Dúns and the Bhábar. The crop is planted in April-May, and the produce is gathered in November. It has been estimated that the cost of cultivating a *bisi* (40 square yards less than a British acre) of turmeric is Rs. 36, for which one rupee goes for rent, Rs. 5 for sowing, Rs. 3 for planting out, Rs. 20 for seed, Rs. 4½ for weeding and hoeing, and Rs. 2½ for harvesting. An acre will produce 30 maunds, worth Rs. 60, and when cured and dried about 7½ maunds worth Rs. 75; giving a net profit of Rs. 31 per *bisi*. *C. angustifolia* is found wild in Kumaon.

Zingiber officinale, Ros. ; *Amomum zingiber*, Linn. Ginger—*Sonth* (green ginger), *adrak* (dried ginger), *ada* (plant).

Belonging to the natural order *Zingiberaceæ*. Root tuberous, biennial. Stems erect and oblique, invested in the smooth sheaths of the leaves; generally three or four feet high, and annual. Leaves sub-sessile on their long, vaginated sheaths, bifarious, linear-lanceolate, very smooth above, and nearly so underneath. Sheaths smooth, crowned with a bifid stipular ligula. Peduncles radical, solitary, a little removed from the stems, from 6 to 12" long, enveloped in a few obtuse sheaths, the uppermost of which sometimes end in tolerably long leaves. Spikes oblong, the size of a man's thumb. Bracts, exterior imbricated, 1-flowered obovate, smooth, membranaceous-bordered, faintly striated lengthway; interior solitary, enveloping the germ, perianth, and the greater part of the tube of the corol. Flowers rather small when compared with the rest of this natural order. Calyx superior, 1-leaved, opening on one-side, apex 3-toothed. Corol with a double border; exterior of three, nearly equal, oblong segments. Lip 3-lobed, and of a dark purple colour. Nectarial filaments of König large, subulate, finepointed. Filament short. Anther oblong, double crowned with a long, curved, tapering, grooved hornlet. Germ oval, 3-celled, with many ovula in each. Style filiform. Stigma funnel-shaped, ciliate, lodged just under the apex of the hornlet of the anther. Roxburgh, 16; Drury (U. P.) 463.

This famous plant is too well known to require any further description. It thrives well in the lower hills, and there forms an important crop in rich, well-drained, heavy soil. The following description of the mode of cultivation in the Calicut district in Madras is of interest in connection with its local importance in our hill districts:—

"At the commencement of the monsoon beds of ten or twelve feet long by three or four feet wide are formed, and in these beds small holes are dug

at three-fourths to one foot apart, which are filled with manure. The roots, hitherto carefully buried under sheds, are dug out, the good ones picked from those which are affected by the moisture or any other concomitant of a half-year's exclusion from the atmosphere, and the process of clipping them into suitable sizes for planting, performed by cutting the ginger into pieces of an inch and a half to two inches long. These are then buried in the holes which have been previously manured and the whole of the beds are then covered with a good thick layer of green leaves, which, whilst they serve as manure, also contribute to keep the beds from unnecessary dampness, which might otherwise be occasioned by the heavy falls of rain during the months of June and July.

“ Rain is essentially requisite for the growth of the ginger ; it is also, however, necessary that the beds be constantly kept from inundation, which, if not carefully attended to, the crop is entirely ruined ; great precaution is therefore taken in forming drains between the beds, letting water out, thus preventing a superfluity. On account of the great tendency some kinds of leaves have to breed worms and insects, strict care is observed in the choosing of them, and none but the particular kinds used in manuring ginger are taken in, lest the wrong ones might fetch in worms, which, if once in the beds, no remedy can be resorted to successfully destroy them ; thus they in a very short time ruin the crop.

“ Worms bred from the leaves laid on the soil, though highly destructive, are not so pernicious to ginger cultivation as those which proceed from the effect of the soil. The former kind, whilst they destroy the beds in which they once appear, do not spread themselves to the other beds, be they ever so close, but the latter kind must of course be found in almost all the beds, as they do not proceed from accidental causes, but from the nature of the soil. In cases like these the whole crop is oftentimes ruined, and the cultivators are thereby subjected to heavy losses.”

The most approved mode of cultivating ginger in Kumaon is as follows :— A piece of ground is selected not liable to be flooded, and a trench is dug on the upper side to prevent water flowing over it. This ground is well hoed and manured and prepared as for sugarcane. The manure should be old, and not spared. In Chait the sowing commences. The ginger is then planted in trenches about half a foot deep, with one foot space between each trench and between each plant. The earth is then heaped over the trenches as is done with potatoes. After the planting is completed, the whole field is covered over with leaves so dense as to conceal both the trenches and intermediate spaces. To prevent the leaves from being blown away, long poles or bambus are laid on

them along the trenches. These poles are removed in Asárh, but the leaves are never disturbed until the ginger crop is dug up. To preclude such disturbance, the weeding is made solely by the hand, without the aid of spade, hoe, or any other implement. Grass or straw is not found to answer so well as leaves, but as the latter if detached would be liable to be blown away, small branches are previously collected and dried for the purpose. Here branches of oak are preferred, as that leaf is found to adhere to the stem and to last longer than any other. The hill cultivators are unanimous in ascribing to this covering of leaves the superior quality of this ginger.

***Amomum subulatum*, Roxb. Cardamom—*Itáichi*.**

Belonging to the natural order *Zingiberaceæ*. Root tuberous, creeping at a small distance under the surface of the soil, &c., as in the genus, and amply furnished with numerous, strong fibres. Stems erect, about three or four feet high, and about as thick as the little finger. Leaves alternate, bifarious, sessile on their sheaths, narrow-lanceolar, finely acuminate, deep green, and smooth on both sides; from 12 to 15" long by 3 or 4" broad. Sheaths smooth, margins coloured, and rising above the mouth into an emarginate ligula. Spikes radical, compact, a little elevated above the soil, obovate, size of a goose-egg, echinate with the long, subulate, pale yellow points of the bracts, inner calyx and upper segments of the exterior border of the corol. Fracts numerous; the exterior imbricated upward, obovate dark-red, smooth, long-subulate, pointed, 1-flowered; the inner, or inferior calyx, spathiform, opening on one side. Flowers large, yellow. Calyx superior, 3-cleft, segments subulate, and much longer than the tube of the corol. Corol; exterior border of three nearly equal segments, the upper one ends subulately. Lip oblong, often emarginate; margins a little curled, deeper yellow than the exterior segments. Filament flat. Another 2-lobed and crowned with an entire crest. Germ 3-celled, with many ovula in each, attached to the thick partitions, a little removed from the axis. Style, stigma, and nectarial scales of König as in the genus. Roxburgh, 15.

Grown in Kumaon and Garhwál and largely imported from Népál.

***Allium sativum*, Linn. Garlic.—*Lahsun*.**

Largely cultivated as a vegetable and a condiment. Eaten cooked with curries. Brahmans and Baniyas object to using it, as they consider the bulb has some resemblance to flesh, which is a forbidden article of food for them.

***Areca catechu*, Linn.; *A fanfel*, Gaertn. Betel-nut palm, areca palm—*Supdri* (seed).** Belonging to the natural order *Palmaceæ*. A palm, spathe double, spadix much branched, male flowers numerous, above the female, sessile; calyx, 1-lobed, 3-cornered, 3-partite; petals 3 oblong, smooth; stamens 2-partite, inserted round the base of the style; female flowers 1-3 at the base of each ramification, sessile, calyx 5-lobed; flowers small, white, fragrant. Drury (U. P.), 46; Roxburgh, 665, Brandis, 551.

The most beautiful palm in India, cultivated for its seeds, which are eaten with the *pán* leaf, lime, catechu and condiments. Roasted and powdered they make an excellent dentifrice. I do not know of its being cultivated in the provinces, unless along the Gorakhpur frontier. All that I have seen have been imported.

D.—Green

The vegetable products used as greens may be conveniently divided into the following classes :—

1. Plants specially cultivated for food as greens, such as *gobi*, *pálak*, *methi*.
2. Products collected from plants cultivated for other purposes, such as the leaves of gram and the various species of mustard.
3. Leaves and flowers of wild plants like several of the nettles and yams and tubers, bulb and stems of wild plants used as food, such as the wild yams.

Greens are cooked in much water and then pressed to get rid of the excess moisture and seasoned with spices and clarified butter, and in this form are called *ság*. When cooked in a moderate quantity of water, which leaves them crisp and dry, they are called *bhangiya*. In either form they are, as a rule, insipid and utterly foreign to European tastes. They are seldom eaten alone, and usually with cereals, pulses, or other vegetables.

(a).—Plants specially cultivated as greens.

<i>Brassica oleracea</i> .	<i>Amaranthus polygamus</i> .
„ <i>juncea</i> .	<i>Ocimum sanctum</i> .
<i>Eruca sativa</i> .	„ <i>basilicum</i> .
<i>Nasturtium officinale</i> .	<i>Beta vulgaris</i> .
<i>Lepidium sativum</i> .	<i>Chenopodium album</i> .
<i>Oxalis corniculata</i> .	„ <i>viride</i> .
<i>Trigonella fenumgræcum</i> .	<i>Phytolacca acinosa</i> .
<i>Portulaca oleracea</i> .	<i>Basella rubra</i> .
„ <i>sativa</i> .	<i>Rumex vesicarius</i> .
<i>Celosia cristata</i> .	<i>Perilla ocimoides</i> .

Brassica oleracea, Linn. Cabbage—*Gobi*.

This with its varieties is cultivated in all districts.

Belongs to the natural order *Cruciferae* and tribe *Eubrassicæ*. Sepals erect; pod sessile, cylindric, beak oval or conical, seedless; valves 1-nerved.

- Var. *capitata*, white cabbage.
 „ *sabauda*, savoy.
 „ *sabauda gemmifera*, Brussels sprouts.
 „ *sabellica*, borecole.
 „ *botrytis*, cauliflower, *phul-gobi*.
 „ *botrytis cymosa*, broccoli.
 „ *caulo-rapa*, knol-kohl, kohl-rabi, *ganth-gobi*.

Sown from August to February. Hooker, Fl. Ind., I., 156: Roxburgh, 497.

These have been introduced by the British and have begun to be largely cultivated in the neighbourhood of large towns where European example and

influence have been felt. They are almost unknown in the villages, and altogether form but a small portion of the food of the great mass of the people.

Brassica juncea, H. f et T. ; *B. Willdenovii*, Boiss. ; *Sinapis juncea*, Linn. ; *S. integrifolia*, Willd. ; *S. ramosa*, *rugosa*, and *cuneifolia*, Roxb. Mustard.—*Rai, sarson*.

Belonging to the natural order *Cruciferae* and sub-order *Brassiceae*, with sepals spreading, pods slightly compressed, beak subulate, usually seedless ; valves 3-ribbed ; seeds globose. Erect, glabrous, lower leaves, oblong-lanceolate, toothed, upper narrow, pods sub-erect torulose, beak long seedless, lateral nerves flexulous. A tall erect, branching annual, rarely glaucous, or hispid (at base only). Lower leaves petioled, sometimes pinnatifid ; upper lanceolate, toothed, sub-sessile. Flowers bright yellow. Pods $\frac{1}{2}$ " linear-lanceolate ; beak straight, flattened $\frac{1}{2}$ " valves with a prominent midrib. Seeds small, dark, rugose. Hooker, Fl. Ind., I., 157.

The leaves are eaten cooked and the seeds yield a medicinal oil.

A. The variety *S. ramosa*, Roxb., is the *barlai* of Kumaon and is chiefly cultivated as a vegetable or green.

It has root annual. Stem erect, very ramous ; branches expanding a little, all perfectly smooth, except now and then, near the base of the plants, a few soft, white bristles are present ; height of the whole plant in a good soil from 4 to 5 feet. Leaves petioled, the lower ones lyrate, in some plants somewhat scabrous, with the margins variously serrate-dentate, and often somewhat lobate ; towards the top of the plants they are less compound, till at last they are simply lanceolate and smooth, varying in size from an inch to a foot in length. Petioles of the lower or large leaves, round, slightly channelled, and sometimes armed like the bottom of the stem, and large branches, with soft white bristles. Racemes terminal ; pedicels expanding. Calyx linear, expanding. Petals obovate, bright yellow. Stamens longer than the claws of the petals. Siliques linear, straight, expanding, from 1 to 2" long, turgid at the seeds, otherwise smooth, somewhat vertically compressed ; beak very short, one-sixth the length of the silique, tapering to a point. Seed in each cell, one row, and rather remote, round, dark brown, beautifully rugose. Roxburgh, 498.

B.—The variety *S. rugosa*, Roxburgh, is the *bádsháhi-lái* and *bhotiya-lái* of Kumaon, where it was introduced by the Gorkhális from Nepal and is now cultivated and highly valued as a green for vegetable curries.

It has scarcely any stem till the plants begin to blossom, when it shoots up quickly 4-6 feet in height, with an expanding ramous branch from the axil of each leaf, all round and smooth. Leaves, the radical ones are petioled, very rugose, and disposed somewhat spirally, which disposition is particularly conspicuous while young ; the cauline leaves are shorter petioled, or even sessile ; the posterior margins of both the radical and cauline leaves variously and deeply jagged ; the anterior margin dentate ; the nerve is remarkably compressed, ribbed, and broad, armed with a few inoffensive bristles underneath, and beyond the middle divides like the radii of a fan, which alone readily distinguishes the species while young from all the other sorts I have yet met with. Floral leaves linear and mostly entire. Racemes terminal, &c., as in the other species. Flowers numerous, bright yellow. Siliques short-peduncled, expanding, linear, obscurely 4-sided, torose ; beak short and subulate. Seeds from ten to twenty in both cells, small, round, dark brown, pitted. Roxburgh, 499.

The leaves of the cultivated and wild varieties of *B. campestris* are also eaten, the wild ones are the *náli* and *láhi* of Bijnor.

Eruca sativa, Lam.; *Brassica eruca*, Linn. Stripe-flowered rocket;—*Dāa*, *seoha* the *dāa* and *chdra* of Kumaon.

Belonging to the same order as the preceding. Glaucous, glabrous or sub-hispid. Stem 6-18". Leaves variously toothed, rarely obovate and sub-entire. Flowers large, pale yellow or white and veined. Sepals often tipped with hairs. Pods 1" erect, and appressed to the stem: pedicels shorter than the calyx: valves twice as long as the broad flattened beak. Hooker, Fl. Ind., I, 168.

It comes up accidentally with the other species of mustard about Almora, but is also sparsely cultivated—both in the hills and plains along the edges of corn fields—for its oil, which is less pungent and more oily than mustard, and the leaves are used as a fodder.

Nasturtium officinale, Brown. Water-cress—*Lūt-patiya*, *priya*, and *priya-halim* (Kumaon).

Belonging to the natural order *Cruciferae* and sub-order *Arabideae*. Aquatic, stem creeping and floating, ramous: leaves pinnate, the upper with 3-7 pinnules and a terminal one, the lower cut into 3 repand segments; leaflets sinuate-lobed. Flowers white, small in short racemes. Petals longer than the sepals; pods $\frac{1}{2}$ -1" stalked, spreading or bent upwards: seeds small, 2-seriate. Hooker, Fl. Ind., II, 133.

Cultivated in hills and plains, but occurs wild in the lower hills, Kota and Dehra Dūn and up to 4-5,000 feet; perhaps escaped. *N. indicum*, D. C., occurs wild.

The following garden species may also be mentioned:—

Crambe maritima, Linn.; sea-kale.

Cochlearia armorica, Linn.; horse-radish. *C. flava* occurs wild.

Barbarea vulgaris, Brown; cress, *wiláyati-halim*.

Barbarea praecox—American cress.

Tragopogon porrifolium—Salsify.

Sium sisarum—Skirret.

Scorzonera hispanica—Scorzonera.

Lepidium sativum, Linn, Cress—*Halim*, *halang*.

Belonging to the natural order *Cruciferae* and sub-order *Lepidineae*. A glabrous, erect, annual 6-18" high; radical leaves long-petioled; cauline sessile and usually entire. Flowers small, in long racemes, white. Pods deeply notched: pedicels appressed. Hooker, Fl. Ind., I, 159; Roxburgh, 497.

Cultivated throughout India and Western Tibet. This is eaten either raw as a relish or boiled as an ingredient in vegetable curries.

Portulaca oleracea, Linn.; *P. suffruticosa*, Thw. Small purslain—*Lúniya*, *nániya*, *lúnah*, *desi-hulfah*.

Annual, herbaceous, diffuse; leaves scattered, entire cuneiform, fleshy; axils and joints naked; flowers sessile; petals 5; flowers, small, yellow; open at noon, close at 2; capsule 1-celled; seeds numerous. Drury (U. P.), 344; Roxburgh, 391; Hooker, Fl. Ind., I, 246.

Green leaves are eaten ; cultivated everywhere as a salad. The *porcilaca* of Pliny.

Portulaca sativa, Linn. Purslain—*Chúli*, *khurfah*.

Purslain is occasionally cultivated ; leaves broad, flowers white, yielding a small black seed. The leaves are somewhat acrid and bitter and are used as a vegetable with curries and as a salad ingredient. It grows wild during the hot season. It is cooked alone or with curries.

Oxalis corniculata, Linn.; *O. repens*, Thunb.; *O. pusilla*, Salisb. Procumbent oxalis. *Anrái*, *chalmori* (Kumaon).

Belonging to the natural order *Geraniaceæ* and sub-order *Oxalideæ*. A very variable weed, abundant in cultivated places, and sometimes half cultivated. Leaves long-petioled; leaflets obcordate ; flowers sub-umbellate, sepals, obtuse, bracts setaceous. Petals yellow obcordate. Fruiting pedicels depressed ; capsule tomentose, sub-cylindric, cells many seeded. Seeds transversely ribbed. Hooker, Fl. Ind., I., 436; Drury (U. P.), 355; Roxburgh, 389.

Used as a salad.

Trigonella Fœnum-Græcum, Linn ; Fenugreek—*Methi*.

An annual belonging to the natural order *Leguminosæ* and sub-order *Trifolia*. Robust, erect, subglabrous. Stipules not lacinated ; leaflets toothed $\frac{3}{4}$ -1" inch long, oblanceolate oblong. Flowers 1-2, sessile in the axils of the leaves. Calyx $\frac{1}{4}$ - $\frac{1}{2}$ " linear. Corolla much exerted. Pod 2-3" long, 10-20 seeded, with a long persistent beak often falcate. Hooker, Fl. Ind., II., 87; Roxburgh, 588.

Much cultivated and of high repute. Cooked either alone as a relish with unleavened bread (*roti*) or with flesh, rice, pulse or flour, and in curries.

Celosia cristata, Linn.; *Amaranthus vulgaris*, Rumph.—*Murga*.

Belonging to the natural order *Amaranthaceæ*. An annual erect plant; leaves oblong-ovate, peduncled, round, striated spikes oblong. Roxburgh, 228.

There are two varieties, one red and one yellow, cultivated in gardens in the plains for their stems and leaves, which are used as greens.

Amaranthus polygamus, Linn. *Chaulái*, a name also given to *A. frumentaceus*. See Cultivated food grains.

Belonging to the natural order *Amaranthaceæ*. Stem when the plants are young, and in good soil, erect, about a foot high, branchy near the base ; but when old, or in a bad soil, there are only several diffuse, smooth, striated coloured branches; from 9 to 18" long. Leaves petioled, rhombiform, emarginate with a bristle, rugose generally about an inch long. Glomerules axillary, very rarely on terminal or other spikes. Male flowers most numerous triandrous. Calyx twice the length of the capsule, leaflets awl-pointed. Capsules shorter than the calyx, less bullate than in *A. prostratus*. Roxburgh, 661.

This and several other species of *Amaranth* are cultivated all over these provinces as greens :—

A. oleraceus, Willd., Roxburgh, 662.

A. tristis, Willd., Roxburgh, 661.

A. gangeticus, Willd., Roxburgh, 662.

The last is commonly known under the name *lál-ság*, and both it and *A. oleraceus* are pulled up by the roots when used, whilst the leaves of the

other two are plucked as wanted. The more common wild species of which the leaves are used as greens are :—

A. polygonoides, Willd., Roxburgh, 661.

A. viridis, Willd., Roxburgh, 661.

A. lanceolatus, Roxburgh, 662.

A. spinosus, Roxburgh, 663 ; the *márk* of Bijnor.

The whole synonymy of this genus at present, appears to be somewhat obscure and confused. The leaves and stems of *gojawa*, a small wild variety, are eaten in these provinces, but I have not been able to trace it to its specific source.

Ocimum sanctum, Linn. Purple-stalked basil—*Tulsi*.

Belonging to the natural order *Labiata*. Somewhat shrubby, stem short, woolly perennial. Branches numerous, opposite, round, dark-purple, hairy. Leaves opposite, petioled, oval, serrate, downy, dark-coloured, about 1½" long and 1" broad. Racemes terminal, erect, dark-purple, hairy 4-sided. Bracts opposite, petioled, cordate reflexed, 3-flowered (i. e. verticels 6-flowered.) Roxburgh, 463 ; Drury (U. P.), 327.

This is a very grateful smelling plant. The Brahmans hold it sacred to their gods Krishna and Vishnu. *O. Basilicum*, Linn., sweet basil *káli túlsi*, is cultivated as a pot-herb, whilst *O. sanctum*, though useful for that purpose, is usually only grown for flower offerings to the gods by Hindus, but as a pot-herb by Europeans.

The following are chiefly cultivated in the gardens of Europeans and do not require description :—

Origanum Marjorana, Linn. Sweet marjoram ;—*Marwa*. *O. normale*, the *ban túlsi*, occurs wild in Kumaon.

Rosmarinus officinalis, Linn. Rosemary ;—*Rismari*.

Salvia officinalis, Willd., Sage ;—*salbia*. *S. (Æthiopis) lanata*, Roxb., *ganiya*, is naturalised and common ; *S. plebeia* also occurs wild.

Salvia Sclarea, Willd. ; clary.

Satureja hortensis, Willd. ; savory.

Thymus vulgaris, Linn. ; thyme ;—*ipár*. *T. Serpyllum*, the *ban-ajwáin*, occurs wild in Kumaon and is also used as a flavouring pot-herb.

Beta vulgaris, Linn., variety *B. bengalensis*, Roxburgh.—*Pálak, pálang*. See *Vegetables*.

Chenopodium album, Linn.—*Bhatuwa, bhatu, chardi, betu sag*.

Belonging to the natural order *Chenopodiaceæ*. Annual erect, 2-3 feet high : leaves long, petioled broad, trowel-shaped, obtuse, toward the posterior angles, dentate lobate, mealy. Panicles terminal, erect contracted leafy. Roxburgh, 260.

Leaves used as a pot-herb, seeds also eaten and considered nourishing ; ripens in October. See *Cultivated food grains*.

Chenopodium viride. Willd.—*Ság*

Belongs to the same order as the preceding. Annual, erect 2-3 feet high, leaves long petioled, narrow trowel-shaped, toward the posterior angles, dentate lobate, mealy, while young. Panicles, terminal erect, contracted, leafless, very minute. Roxburgh, 260.

There are two varieties, one entirely green, the other with the angles of the stem and branches of a beautiful purple colour, and the leaves and the mealy panicles somewhat reddish. The leaves are cooked as greens and are a favourite pot-herb.

Phytolacca acinosa, Roxb.; *Rivina Lathenia*, Wall.; *Pircunia Lathenia*, Moq. The *jirrag* of Kumaon, *jirunga* of Jaunsár, *matajor* of the Satlaj valley, *jirka* of Biás valley and *lábúr* of Hazára.

Belonging to the natural order *Verbenaceæ*. Herbaceous, erect, ramous, leaves alternate, short petiolate, ovate-lanceolate, 6-10" long. Flowers greenish white pedicellate, bi-sexual in lax cylindrical racemes with lanceolate or subulate bracts. Perianth of 5 distinct segments; stamens 8-10; pistils 6-8 distinct 1-ovuled carpels. Fruit dark purple and succulent, the carpels remaining distinct, forming an erect, cylindrical raceme 4-8" long, 1-1½" in diameter. Flowers in June, fruit in September-October. Brandis, 371; Roxburgh, 389.

Moquin and others make it a variety of *P. decandra*, Linn., but with this identification Brandis does not agree (see l. c.).

This plant is cultivated all over the Himálaya from Hazára to Nepal and in Kumaon up to 10,000 feet for its leaves, which are eaten as a vegetable.

Basella rubra, Willd.—*Pát, poi*.

Belonging to the natural order *Basellaceæ*. Perennial, twining; leaves cordate smooth, entire, fleshy; calyx, 7-cleft, with the two opposite divisions broader; at last it produces a berry, 1-seeded. Roxburgh, 275.

There are two principal cultivated varieties, the white (*safed-púi*) and red (*lál púi*) grown all over these provinces, besides several wild varieties. The cultivated differ from the wild in being more luxuriant and are raised from seeds. The smooth fleshy leaves are cooked as a spinach.

Rumex vesicarius, Linn. Sorrel.—*Chúka* and *chúka-pálak* or *chúka-pálang*.

Belongs to the natural order *Polygonaceæ*. Leaves undivided; flowers hermaphrodite, germinate, all the valves very large, membranaceous, reflexed; calyx 3-leaved; petals three converging; 3-seeded. Roxburgh, 309.

Commonly cultivated and used as greens. Sown in beds near the garden wells and may be had all the year round if care be taken.

Perilla ocymoides, Linn.; *Mentha ocymoides*, Roxburgh.—*Bhangura*.

Belonging to the natural order *Labiata* and sub-order *Menthae*. Annual, hairy. Stem erect with four rounded angles and excavated sides, hairy. Branches opposite, expanding and, like the stem of the most luxuriant plants, about 3 feet high. Leaves opposite, long-petioled, broad, cordate, grossly-serrate, hairy on both sides, from 3 to 5" long, and from 2 to 4 broad. Petioles hairy, channelled. Racemes axillary and terminal, sessile, 4-sided, particularly before the flowers expand. Bracts lanceolate, acute, 1-flowered. Flowers in opposite, decussate, approximate pairs, tending to point to one side only. Calyx hairy; divi-

sions five, nearly equal. Corol, the upper segment emarginate; the under one much broader and longer, sub-uniform. Stamens rather shorter than the corol. Anthers of two distinct lobes. Roxburgh, 460.

Cultivated in the hills of these provinces, both as a greens and for the oil expressed from its seeds, which is used for culinary purposes and for burning.

Although none of these plants recorded under "Greens" is in itself life-supporting and nutritious, yet it is wholesome, and if eaten in moderation, digestible and serves at least to eke out the slender resources of the poor labourer's larder (?), who is often hard put to in order to find food for his hungry family.

LEAVES USED AS GREENS OF CULTIVATED PLANTS NOT SPECIALLY GROWN FOR THE PURPOSE.

Under this head the following may be briefly noticed:—

Coriandrum sativum, Linn. Coriander.—*Dhaniya*. The leaves used as a spinach: cultivated for seeds. See *Spices*.

Carthamus tinctorius, Linn.—*Kasam*; safflower. The leaves are used as a spinach: cultivated for its flowers. See *Dyes*.

Cicer arietinum, Linn. Gram.—*Chan*. Leaves used as a spinach: cultivated for its seeds. See *Cultivated food grains*.

The leaves of most of the pulses, such as *lobiya*, *sem*, &c., grown for their seeds are also eaten; also of *Brassica campestris* and *Perilla ocimoides* grown for their oil seeds; of the different species of *Arum* grown for their tubers; and of *Corchorus olitorius*, Linn., and *Hibiscus cannabinus*, Linn., grown for their fibres.

The leaves and flowers of wild plants used as food will come under the last section of this Part.

E.—Fruits, cultivated and wild.

The following list comprises the fruits, cultivated and wild, found in these provinces which furnish edible products alone or in combination with other food-material. The notes attached to each description are, as already stated, chiefly derived from the writings already mentioned or personal observation. The trees and plants are arranged according to the natural orders, and the following are noticed in this section:—

Dillenia indica; *chalta*.
Anona squamosa; *sharīfah*.
 " *reticulata*; *sharīfah-wilāyati*.
Berberis asiatica; *kilmora*.
 " *aristata*; *chotra*.
Capparis aphylla; *karil*.
Flacourtia Ramontchi; *kandāi*.
Saurauja nepalensis; *gogtā*.

Bombax malabaricum; *semal*.
Stereulia urens; *kūtra*.
Grewia asiatica; *pharsiya*.
Elmoearpus Varunus; *julpai*.
Averrhoa Carambola; *kawrakh*.
 " *Bilimbi*; *bil mba*.
Limonia acidissima; *beli*.
Glycosmis pentaphylla, *ban nmbu*.

Citrus medica; *bijaura*.
Citrus Aurantium; *nārangī*.
 „ *decumana*; *chakotra*.
Feronia Elephantum; *kath-bel*.
Egle Marmelos; *bel*.
Garuga pinnata; *kītmira*.
Zizyphus Jujuba; *ber*.
 „ *vulgaris*; *beri*.
 „ *nummularia*; *jhār-ber*.
 „ *Enoplia*; *mako*.
Hovenia dulcis; *chamhūn*.
Sageretia oppositifolia; *aglaia*.
Vitis vinifera; *angūr*.
 „ *lanata*; *purain*.
Æsculus indica; *pānkar*.
Nepheium Lit-chi; *kchi*.
Semecarpus Anacardium; *bhilāwa*.
Mangifera indica; *ām*.
Buchanania latifolia; *kath-bhilāwa*.
Spondias mangifera; *amru*.
Moringa pterygosperma; *sahajna*.
Bauhinia malabarica; *amli*.
 „ *purpurea*; *khairwāl*.
 „ *variegata*; *kachnār*.
Tamarindus indica; *imli*.
Cassia Fistula; *amaltās*.
Prunus amygdalus; *budām*.
 „ *persica*; *aru*.
 „ *armeniaca*; *chūāru*.
 „ *Avium*; *gilās*.
 „ *Cerasus*; *alu-bālu*.
 „ *Paddum*; *padam*.
 „ *communis*; *alūcha*.
 „ *Padus*; *jāmana*.
 „ *nepalensis*; *do*.
Prinsepia utilis; *jāniela*.
Rubus lanatus; *hīsālu*.
 „ *paniculatus*; *kāla hīsālu*.
 „ *moluccarus*; *katrol*.
 „ *niveus*; *ptlu-hīsālu*.
 „ *lasiocarpus*; *hīsālu*.
 „ *ellipticus*; *gavri-phal*.
 „ *nutans*; *sinjang-cho*.
Fragaria indica; *strawberry*.
Eriobotrya japonica; *loquats*.
Cydonia vulgaris; *biki*.
Pyrus communis; *nāspāti*.
 „ *Pashia*; *do*.
 „ *Malus*; *seo*.
 „ *baccata*; *ban-mekal*.
 „ *lanata*; *mekal*.
Ribes Grössularia; *lepcha*.

Ribes glaciale; *māngle*.
 „ *nigrum*; *pāpar*.
 „ *rubrum*; *niangha*.
Terminalia belerica; *bakera*.
Psidium Guyava; *amrud*.
Eugenia Jambolana; *jāman*.
Punica Granatum; *andar*.
Alangium Lamarekii; *akola*.
Cornus macrophylla; *kāyshi*.
Lonicera angustifolia; *geang*.
Viburnum stellulatum; *tāl-maliya*.
Anthocephalus Cadamba; *kadani*.
Randia uliginosa; *pindāru*.
 „ *dumetorum*; *mainphal*.
Mæsa argentea; *phasera*.
Bassia latifolia; *mahua*.
 „ *butyracea*; *chiāra*.
Mimusops indica; *khirni*.
 „ *Elengi*; *maulsāri*.
Diospyros Melanoxylon; *tenda*.
Salvadora obooides; *jhāl*.
Carissa Carandas; *karanda*.
Orthanthera viminea; *mahār*.
Cordia Myxa; *luhsora*.
Cordia vestita kumbhi.
Ehretia serrata; *koda*.
 „ *lævis*; *chamror*.
Hippophaë salicifolia; *tarwa-chuk*.
Elæagnus latifolia; *ghiwāi*.
Morus indica; *tāt*.
 „ *lesvigata*; *shah-tāt*.
Ficus Carica; *anjār*.
 „ *virgata*; *beru*.
 „ *Cunia*; *kuniya*.
 „ *glomerata*; *gūlar*.
 „ *Roxburghii*; *timla*.
Artocarpus integrifolia; *kathal*.
 „ *Lakoocha*; *barhal*.
Coltis australis; *kkarak*.
Antidesma diandrum; *amli*.
Briedelia retusa; *khaja*.
Phyllanthus Emblica; *aonla*.
Securinega obovata; *dhāni*.
Castanea vulgaris; *chestnut*.
Corylus Colurna; *bhotiya-badām*.
Myrica sapida; *kāiphal*.
Juglans regia; *walnut*.
Ephœdra vulgaris; *khana*.
Borassus flabelliformis; *tār*.
Musa sapientum; *plantain*.
Dendrocalamus strictus; *bambu*.

Dillenia indica, Linn; *D. speciosa* and *D. elliptica*, Thunb.—*Chalta*, *chalita*.

Belonging to the natural order *Dilleniaceæ* and sub-order *Dillenieæ*. A round headed tree, branches tomentose: leaves lanceolate, serrate, 8-10" by 2-4", fasciated at the ends of the branches, acute, veins close-set, glabrous above, pubescent especially on the nerves beneath. Flowers solitary, 6" diameter, sub-terminal: sepals orbicular, thick, and fleshy. Petals white, obovate. Inner stamens arching over the outer. Seeds compressed, margins hairy. Hooker Fl. Ind., I, 36; Roxburgh, 451; Brandis, 1; Drury, F. P., I, 10.

Occurs wild along the base of the N.-W. Himālaya (Kumaun and Garhwāl) and somewhat rarely in the plains. The thick fleshy leaves of the calyx are eaten raw or cooked in curries or made into sherbet or into a jelly. The flowers

appear in June-July. The flower buds and young fruit of *D. pentagyna*, the *aggai* of Oudh (Brandis, 2; Hooker, *l. c.*, 38) have a pleasant sub-acid flavour and are also eaten raw or cooked. The fruit, which ripens in May, is eaten.

Anona squamosa, Linn. Indian custard-apple, sweet-sop.—*Ata*, *lína* (Gházipur), *sita-phal* (Bundelkhand), *shartfah*, *behlí*.

Belonging to the natural order *Anonaceæ* and sub-order *Xylopicæ*. A small tree; leaves oblong, obtuse, or acuminate, glaucous beneath and pubescent when young, 2-3" by $\frac{1}{2}$ -1 $\frac{1}{2}$ ", membranous. Flowers solitary, 1" long, pubescent: petals 3, narrow-oblong. Fruit tubercled, fleshy, areolate. Hooker, *Fl. Ind.*, 1, 78; Roxburgh, 453; Drury (*U. P.*), 41; Brandis, 6.

Naturalised and cultivated in the plains for its fruit: the seeds are acrid and fatal to insects, and are therefore used with gram flour in hair washes (Royle). Fruit ripens July-October. Apparently wild under the name *behe* in the swamps near Barmdeo in the Kumaon Bhábar.

Anona reticulata, Linn. West Indian custard-apple, bullock's heart.—*Lavani*, *nána*, *rámaphal*, *shartfah-wildiyati*.

Belonging to the same natural order as the preceding. A small tree; leaves oblong or oblong lanceolate, quite glabrous, smooth or roughish beneath, 5-8" by 1 $\frac{1}{2}$ -2", base acute, petiole $\frac{1}{4}$ ". Flowers 2-3 together on lateral peduncles. Outer petals as in preceding, inner very small, narrow-oblong. Fruit smooth, slightly areolate, subglobose, roughish outside with pentagonal areoles. Hooker, *l. c.*, 78; Roxburgh, 453.

A West Indian species, now completely naturalised in India and cultivated in the plains of these provinces. I have not seen in these provinces *A. muricata*, Linn., sour-sop, known by its fruit being muricated with soft prickles.

Berberis asiatica, Roxb.; *B. hypoleuca*, Lindl. Round-fruited barberry.—*Kilmora* (Kumaon).

Belonging to the natural order *Berberidaceæ* and sub-order *Berberideæ*. A stout, erect, spinous shrub, bark pale. Leaves simple; fasciculate, on short tuberculate branchlets, often $\frac{1}{4}$ " long in the axils of short trifid spines, which are often wanting; obovate or orbicular, hard, coriaceous, white beneath, with strong reticulate venation, lacunose between the veins, subentire, or with large, distinct, spinescent teeth. Flowers in short corymbose racemes. Berries large, ovoid or often subglobose, red or black, glaucous; stigma capitate on a distinct style. Brandis, 12; Hooker, *Fl. Ind.*, 1, 110; Roxburgh,

The large berries are eaten in the hills and the shrub occurs from 3—10,000 feet along the outer Himálaya, flowering in March-April. The fruit is used in Kumaon to flavour spirits. In Kumaon it descends to the upper limit of *Acacia Catechu*, about 2,500 feet (Madden). It is the *dáru-haridra* of Sanskrit writers and *dár-hald* of the Persians, from the wood of which the *rasot* is extracted. Pharm. 13.

Berberis aristata, D. C.; *B. tinctoria*, Lesch. Cylindrical fruited barberry.—*Chotra*, *kilgora*, *totar* (Kumaon): *náchi-shin* of the Bhotiyas of Byáns.

Belonging to the same natural order as the preceding. An erect, spinous shrub. Leaves more or less persistent, coriaceous, but not hard obovate or oblanceolate, entire, or with few, large, distant, spinescent teeth, fasciculate on very short lateral branchlets, in the axil of a trifid or simple spine with a broad base. Flowers in compound racemes, pedicels often fasci-

culate. Berries often thickly covered with glaucous bloom, cylindrical, tapering into a short style terminated by a small subglobose stigma. Brandis, 12; Hooker, (*l. c.*), 110.

Hooker notes three varieties, all of which are found in Kumaon and Garhwal. The berries are edible and are often dried like raisins. H. Strachey pronounces the fruit of the variety met with in Byáns in Kumaon as worthless, but still it is eaten by the Bhotiyas. Moorcroft states that the fruit of a barberry in Kumaon is boiled with capsicums to be used as a sauce. Flowers May-June. The root and dried extract (*rasot*) of this and *B. Lycium*, Royle, are used in medicine (see *Drugs*), and also as a dye (see *Dyes*). The berries of *B. nepalensis*, Spreng (Hooker, *l. c.*, 109) are also eaten in Kumaon, and those of *B. vulgaris* (Brandis, 11,) which also occurs in Kumaon, when dried are probably the same as the *zirishk-turs h* of Afghánistán (S.)

Capparis aphylla, Roth.; *C. Sodada*, Br.; *Sodada decidua*, Forsk. Indian caper.—*Karíl, kari*.

Belonging to the natural order *Capparidæ* and sub-order *Cappareæ*. A dense much branched shrub; branches slender glabrous, thorns in pairs straight; leaves (only on young shoots) glabrous, linear pungent; buds pubescent. Flowers 1" in diameter, red-brown, in many-flowered corymbs on short lateral shoots; outer sepals subvalvate, ciliate; inner very saccate; stamens 18-20. Fruit $\frac{1}{2}$ -" glabrous, long-beaked. Hooker, Fl. Ind., I., 175; Brandis, 14.

Common in Bundelkhand and in dry stony places in the plains; flowering in March-May. The fruit (*tent*), both ripe and unripe, is cooked and eaten, and also made into pickle. When unripe it is generally steeped for 15 days in salt and water and then put in the sun to ferment till it becomes acid, pepper and oil, &c., being added. It will keep thus for a year (S). The caper of commerce is derived from *C. rupestris*, Sibth., which is only a variety of the common Himalayan species, *C. spinosa*, Linn. Capers can be made from this (the *ulta-kánta* of Kumaon), and have been preserved in vinegar in Kumaon. The flower-buds (*pási*) of both and *C. horrida*, Linn., *f.*, are used as a pickle and the fruit is pickled and exported, whilst the leaves form a favourite food for goats and sheep: see, further, Hooker and Brandis, *l. c.*

Flacourtia Ramontchi, L'Hérit.; *F. sapida*, Roxb.—*Bilángra, bhanber* (Bijnor), *kandí, kandái* (Kumaon), *kattár* (N.-W. P.); *hatta* (Oudh).

Belonging to the natural order *Biziniæ* and sub-order *Flacourtiæ*. Armed; leaves alternate, shortly petiolate, varying much in shape, ovate oblong, ovate obovate, or suborbicular, obtusely serrate or crenate, generally tomentose beneath, glabrous above. Flowers small, greenish yellow, in short racemes, or panicles with short side-branches. Styles 5-11, united at the base. Fruit dark red or black, about $\frac{1}{4}$ " long. Seeds 8-16, generally in two layers, one above the other. This species, as defined by Hooker (*l. c.*) comprises the two old species, *F. Ramontchi* and *sapida*; the forms vary extremely, and require further study. Very remarkable is a tomentose form (var. *occidentalis*) from Behar, the Dekkan, Oudh, Rohilkhand, and the Panjab. Brandis, 18; Hooker, Fl. Ind., I, 193; Roxburgh, 739.

The fruit ripens in May-June and is eaten when ripe, either raw or cooked. Occurs wild on dry rocky places in the plains and lower hills and is occasionally

cultivated for the fruit. Madden notices that *F. sepiaria*, Roxb., a thorny shrub, occurs in Kumaon; it is also found in the plains and yields an edible fruit. (Roxburgh, 739).

Saurauja nepalensis, D. C.; *S. paniculata*, Wall.; *Ternstramia racemosa*, Don.; *Zanthoxylum Serra*, Turcz.—The *gogina* and *gogána* of Kumaon.

A tree belonging to the natural order *Ternstramiaceæ* and sub-order *Sauraujeæ*. A moderate sized tree; youngest branches, petioles, midribs and peduncles covered with scurfy tomentum, mixed with brown, deciduous, acuminate scales. Leaves 10-15 by 3-4" narrow oblong elliptic, rounded at the base, shortly acuminate, strongly serrate, nearly glabrous above, thinly ferruginous tomentose beneath; petioles 1-1½". Flowers ½" diam., pink. Sepals ½". Petals at length recurved at the apex. Fruit green, mealy inside, edible, sweet. Seeds red-brown. Varies with elliptic obtuse leaves. Hooker, Fl. Ind., I, 286; Brandis, 25.

Common along the outer Himálaya from the Jumna to the Sarda: flowers in May, and the fruit ripens in June. The fruit is succulent and palatable and is eaten in the hills.

Bombax malabaricum, D. C.; *B. heptaphylla*, Cav. and Roxb.; *B. Ceiba*, Burm.; *Salmalia malabarica*, Schott.; *Gossampinus rubra*, Ham. Cotton tree.—*Semal*, *semar*, *shembal*.

A tree belonging to the natural order *Mulvaceæ* and sub-order *Bombaceæ*. A large tree, covered with stout hard conical prickles; branches spreading. Leaflets 6-12" glabrous; petiole longer than the leaflets, secondary petioles 1". Stipules small, caducous. Flowers numerous, fascicled at or near the ends of the branches. Calyx 1" cup-shaped, smooth externally, silky within, margin slightly lobed, ultimately irregularly cleft, deciduous with the corolla and stamens. Corolla 6-7" red or white. Petals 5, oblong, recurved, fleshy, twice the length of the stamens. Staminal-tube short, filaments numerous, pluriseriate, 5 innermost forked at the top, each with an anther, 10 intermediate shorter, outer very numerous. Style longer than the stamens. Capsule 6-7" ovoid, downy, 5-valved, valves silky within. Seeds numerous, obovate, smooth. Hooker, Fl. Ind., I, 349; Brandis, 31 Roxburgh, 514; Drury (U. P.) 82.

Cultivated and indigenous all over the plains, ascending the hills in Kumaon to 4,800 feet. The calyx of the flower-bud (*simlauta*) is eaten as a vegetable. The wool of the pods, which ripen in April-May, is gathered and used for stuffing pillows and lining quilts. The gum called *mochras* (see *Gums*) and the root are used in medicine (see *Drugs*).

Sterculia urens, Roxb.; *Cavallium urens*, Schott.—*Gulu*, *kátru*, *gulli*.

A tree belonging to the natural order *Sterculiaceæ* and sub-order *Sterculiææ*. A soft-wooded tree, with white papery outer bark, inner fibrous. Trunk erect. Branches spreading, marked with large scars. Leaves about the ends of the branches, 9-12" long and broad, rounded, base cordate, lobes entire acuminate; petiole 6-9". Panicle dense, terminal, 8-flowered, glandular-pubescent. Flowers small, yellow mixed with many. Calyx ¼" diam., campanulate, 5-parted lobes, acute, spreading. Filaments 10. Follicles 5, oblong, radiating, yellow pubescent, with stinging hairs intermixed. Seeds 3-6, oblong, black. Hooker, Fl. Ind., I, 355; Brandis, 33; Roxburgh, 507; Drury (U. P.), 417.

Occurs in the plains and along the base of the hills in the Bhábar and Siwálik tracts and on the Bundelkhand and Mirzapur hills. The seeds ripen

in April-May, and are roasted and eaten or made into a sort of coffee. This tree also yields a gum resembling tragacanth (see *Gums*) and the leaves are used in medicine (see *Drugs*).

Grewia asiatica, Linn.; *G. subinæqualis*, D. C.—*Phalsa*, *pharsiya*, *dhāman*.

Belonging to the natural order *Tiliaceæ* and sub-order *Grewiæ*. A small tree, herbaceous, portions covered with soft yellowish pubescence. Leaves 2-7" obliquely cordate, base 5-nerved, smaller nerves not arched, prominent beneath, transverse ones parallel; petiole $\frac{1}{2}$ " thickened at the top. Stipules nearly as long as the petiole. Peduncles 2 or more, usually shorter, sometimes longer, than the petioles, dividing into 2 or more divergent pedicels. Bracts linear. Flowers $\frac{1}{2}$ " diam. Sepals oblong-lanceolate. Petals yellow, linear-oblong, half the length of the sepals. Drupe globose, 1-2 lobed, pilose, about the size of a pea. A very variable plant. The following form is usually held to be distinct:—

Var. *vestita*, Wall. Cat., 1105 (sp.).—*Phalsa*, *dhāman* (Bijnor), and *pharsiya* (Kumaon). Leaves obovate, acuminate, obscurely 3-lobed, minutely serrate, cymes densely crowded, buds ovoid, not striated. Hooker, Fl. Ind., I., 387; Brandis, 40; Roxburgh, 431.

Cultivated throughout these provinces for its small dark purple berry, which is much esteemed as a pleasant, acid fruit by all classes. From the juice, half-sweet and half-acid, a sherbet is made. Fruit ripens April-May. Bark yields a cordage (see *Fibres*) and a product for clarifying sugar. The fruit of *G. oppositifolia*, Roxb., *bhengul* of Kumaon and *bhenwal* and *bhimul* of Bijnor (Hooker, l. c., 384); of *G. seabrophylla*, Roxb., the *pharsiya* and *gūr-bheli* of Kumaon and *ban-phalsa* of Bijnor (Hooker, l. c. 387); of *G. tiliaefolia*, Vahl., the *pharsa* of Oudh (Hooker, l. c., 386); and of *G. sapida*, Roxb., the *pharsiya* of Bijnor (Hooker, l. c. 387), are also eaten.

Elæocarpus Varunna, Ham.—*Jalpai* (Kumaon).

A tree belonging to the natural order *Tiliaceæ* and sub-division *Heteropetala*. Leaves 3-7" by $1\frac{1}{2}$ -3", base rounded, glabrous, elliptic acuminate serrulate, petiole $1\frac{1}{2}$ -3". Racemes axillary half the length of the leaves and upwards. Flower $\frac{1}{2}$ " in diameter; flower-buds ovate-lanceolate; anthers puberulous; ovary villous; sepals ovate-lanceolate, white, silky; petals oblong fimbriate, downy outside. Hooker, Fl. Ind., I., 407.

A tree representing the *E. serratus*, Linn. (Hooker, l. c., 401), of Assam rarely occurring in the Kumaon Himālaya, and yielding a similar fruit of the size and form of a small olive, which is eaten raw or pickled. Hence the name *jalpai*, the name of the common olive in Hindustān.

Averrhoa Carambola, Linn.—*Kamrakh*, *hamaranga*.

Belonging to the natural order *Geraniaceæ* and sub-order *Oxalideæ*. The genus *Averrhoa* comprises three or four trees having leaves alternate, exstipulate, pinnate, with a terminal leaflet; leaflets subopposite. Flowers small, regular, in paniced axillary or ramal cymes. Sepals 5, imbricate. Petals 5, contorted. Glands 0. Stamens 10, united at the base, all perfect or 5 without anthers. Ovary 5-lobed, 5-celled, without a beak; styles 5, distinct, stigmas capitate; ovules numerous in the cells. Berry oblong, 5-lobed. Seeds naked or arilled, albumen scanty, fleshy; embryo straight.

Averrhoa Carambola is a small tree densely branched ; leaflets 2-5 pairs ovate, or ovate-lanceolate acute glabrous and glaucous beneath, $1\frac{1}{2}$ -3"; petiole stout pubescent. Flowers chiefly axillary, variegated white and purple. Calyx glabrous half as long as the petals. Stamens 10, of which 5 shorter without anthers or sometimes 1 or 2 of these longer and antheriferous. Ovary pubescent. Fruit 3" long, yellow with acutely angled lobes ; seeds arillate ; aril 2-lobed, lacerate. Hooker, Fl Ind., I., 439 ; Brandis, 45 ; Roxburgh, 387 ; Drury (U. P.), 56.

There are two varieties cultivated in the plains of these provinces, one with a sweet and one with a sour fruit ; the former is eaten cooked or made into sherbet, the latter pickled or candied. The fruit ripens in the cold weather. Leaflets irritable to the touch. Roots, leaves, and fruit are medicinal (see *Drugs*).

Averrhoa Bilimbi, Linn.—*Bilimbi*, *bilamba*.

This species has leaflets 5-17 pairs oblong or linear-lanceolate acuminate pubescent beneath, fruit with five rounded lobes, seeds not arillate. References as preceding.

Cultivated in gardens in these provinces for its fruit, which ripens in the rains and is eaten preserved with sugar or in pickle.

Limonia acidissima, Linn. ; *L. crenulata*, Roxb. ; *Hesperethusa acidissima*, *crenulata*, and *ambigua*, Roem.—*Beli*.

Belonging to the natural order *Rutaceæ* and sub-order *Aurantieæ*. A spinous glabrous shrub or small tree, with rigid flexuous woody branches ; spines $\frac{1}{2}$ -1". Leaves 1-4" long ; petiole and rachis jointed, the former narrowly, the latter very broadly winged ; leaflets 1-2", trapezoid-ovate, obtuse and notched at the tip, base cuneate, margins crenulate, nerves slender reticulate ; joints of rachis obovate-oblong, crenulate. Racemes 1" long, pubescent, often leafy ; pedicels slender. Flowers $\frac{1}{2}$ " diam., tetramerous, white, fragrant. Sepals small. Petals elliptic or oblong. Disk annular or columnar. Ovary 4-celled, style short thick ; ovule 1 pendulous in each cell. Berry globose, $\frac{1}{4}$ " diam., 1-4 seeded, very acid. Hooker, Fl. Ind., I., 507 ; Brandis, 47 ; Roxburgh, 364.

Occurs wild in the Siwálíks and Bhábar of Garhwál, south-east of Lál-dháng (Madden) and in the plains where it is half cultivated. The pulp of the fruit is flesh-coloured and very acid, and is used as an ingredient in sherbets and as a medicine (see *Drugs*).

Glycosmis pentaphylla, Correa ; *G. chylocarpa* W. et A. ; *G. arborea*, D. C. *G. Retzii*, Roem. ; *Limonia pentaphylla*, Retz. ; *L. arborea*, Roxb. ; *Myzosperrum chylocarpum*, Retz.—*Bannimba*, *píluu*, *potala*.

Belonging to the natural order *Rutaceæ*. A small evergreen erect shrub, wholly glabrous, exceedingly variable in its foliage. Leaves generally with 3-5 leaflets, often unifoliate ; lateral leaflets alternate or sub-opposite. Leaflets ovate-lanceolate, ovate or obovate, acuminate, 4-12 inch long, penninerved ; main lateral nerves distinct, but not prominent, joined by inconspicuous intramarginal veins. Flowers white, fragrant, in erect terminal or lateral panicles. Berries sub-globose, white, pink, or blue, somewhat compressed, $\frac{1}{4}$ inch across. Brandis, 49 ; Hooker, I., 499.

This shrub forms a thick undergrowth in the Bhábar and sub-montane tract generally where its fruit is commonly eaten when ripe.

Citrus medica, Linn. Citron ; includes the citron, lemon, sweet and acid limes.

Belonging to the natural order *Rutaceæ* and sub-order *Aurantieæ*. A shrub or small tree, flowering and fruiting at most seasons, growing where I found it on steep hillsides (in Sikkim). Leaflet 3.6", elliptic-ovate or ovate-lanceolate; petiole naked or winged. Flowers 5-10 in a raceme, small or middle-sized. Stamens 20-40. The following are the principal varieties, of which I have found one truly wild in Sikkim, with an oblong leaflet 4" long, margined petiole, pink flowers 1" long, narrowly ellipsoid, rough fruit 7" long, of which the upper 2" are contracted into a long conical mamilla, the rind is very thick, and pulp pale yellow. The petals pass into stamens, which would suggest its not being indigenous, but I did not doubt its being so when I gathered it, mainly on dry sunny slopes totally unsuited for any kind of cultivation, where it formed large bushes. Hooker, *Fl. Ind.*, I., 514; Brandis, 52.

Var. I., *medica* proper. Leaflet oblong, petiole short margined or not, flowers usually numerous, fruit large, oblong or obovoid, mamilla obtuse, rind usually warted, thick, tender aromatic, pulp scanty sub-acid. Brandis, 52; *C. Aurantium*, var. *medica*, W. et A.; *C. medica*, Linn. The citron. *Taranj*, *karna*, *bijaura*, *madhakari*, *karan-phal* (Kumaon).

This variety occurs wild in the Bhábar and along the Sarju, under Gangoli in Kumaon. It is cultivated extensively in the plains of these provinces, and is used in making an excellent marmalade and as an ingredient in sherbets. The wild fruit is used for pickling (*khatái*) and the dried rind is made into a preserve.

Var. II., *Limonum*. Leaflet ovate, petiole margined or winged, fruit middle-sized, ovoid yellow mamillate, rind thin, pulp abundant acid. Brandis, 52; *C. Aurantium*, var. *Limonum*, W. et A.; *C. Limonum*, Wall.; *C. medica*, Willd. (*teste* Roxburgh, 590). The lemon.—*Bara ntbu*.

This variety is but sparsely cultivated in these provinces though fine specimens may be found in old gardens in the plains. Madden refers to it *jántra*, a wild variety found in the Kota Dún of Kumaon, and Royle notes one called *behári-nimbu* or *pahári-kághazi* as wild in the Dún and north western Himálaya. Madden states that the lemons produced in and around Almora in the cold season and allowed to mature in straw are of excellent quality.

Var. III., *acida*. Leaflet elliptic-oblong, petiole many times shorter than the leaflet linear or obovate, racemes short, flowers small, petals usually four, fruit usually small globose or ovoid, with a thick or thin rind, pulp pale, sharply acid. Brandis, 52; Roxburgh, 589 (who includes under it the various varieties, if not species, of the sour lemons or limes found in India). The large fruited states of this appear to assume the form of the citron and the smaller to approach the West Indian lime. The sour lime of India. *Ntbu*, *ntbu*, *nimbu*.

This variety is cultivated largely under different local names all over these provinces. The *kághazi-ntbu* or thin-skinned variety of Jaunpur and Azamgarh is celebrated all over Upper India. Next in value is the *páti-ntbu* or small round variety, and there is also a large variety, the *kámaráli-ntbu* of Bengal or *khatta-ntbu* of these provinces. The smaller sour limes are used for sherbets and making lime-juice, and the larger ones for sherbets and for preserves, especially chips.

Var. IV., Limetta. Leaves and flowers as in var. *acida*, fruit globose 3-5" in diameter, rind thin; smooth, juice abundant, sweet, not aromatic. Brandis, 52; *C. Limetta*, Risso; *C. Aurantium*, vars. *Limetta* and *Lumia*, W. et. A., of which the former is the sweet lime with winged or margined petioles, small white flowers, globose or ovoid mammillate fruit and a rind with concave vesicles; and the latter is the sweet lemon, having a simply margined petiole, flowers tinged with red, ovoid-oblong fruit with a long mammilla and rind with convex vesicles. The sweet lime of India. *Mitha-nibu, amrit-phal* (Kumaon).

This variety is commonly cultivated all over these provinces and includes the sweet lime and the sweet lemon, both of which are used in sherbets and the rinds are sliced and dried as flavouring agents. It ripens as far north as the valley of the Sarju, near Bageswar in Kumaon.

Citrus decumana, Linn. Shaddock, pumelo, pumpelmocs. *Chakotra, sada-phal, mahantbu*.

A tree, 30-40 feet; young shoots pubescent. Leaves large 6-9" long, oval-oblong, pubescent beneath, frequently emarginate; petiole broad-winged. Flowers white, large; stamens 16-24. Fruit large, pale yellow, globose or pear shaped; rind thick; pulp pale yellow pink or crimson, sweet or acid; transverse vesicles distinct. Brandis, 55; Hooker, Fl. Ind., I., 516; Roxburgh, 590.

Introduced into India from Java and is now cultivated all over these provinces; ripening in the hills at Hāwalbāgh near Almora. It is a great favourite with all classes and gives fruit all the year round, so that on one tree may be seen the flower and ripe and unripe fruit at the same time.

Citrus Aurantium, Linn.; includes the bitter or Seville orange, the sweet orange, and the bergamot.

Belonging to the same natural order as the preceding. Arboreous, rarely shrubby, young shoots glabrous greenish white, leaflet elliptic or ovate acute obtuse or acuminate, petiole often broadly winged, flowers pure white bisexual, fruit globose generally oblate not mammillate. Hot valleys along the foot of the Himālaya, from Garhwāl eastwards to Sikkim, and in the Khasia Mts.

Hooker writes:—

"A small slender tree, flowering in the rains, and fruiting after them, growing where I have found it in the very bottoms of valleys, and where it did not occur to me to doubt its being indigenous. The fruit was somewhat flattened or nearly globose, about 2" diam., high coloured, and uneatable, being (if I remember aright) mawkish and bitter." The following are the principal cultivated varieties:—

Var. 1, Aurantium proper. Petiole naked or winged, pulp sweet, yellow rarely red. Brandis, For. Fl., 53. *C. Aurantium*, L; Roxburgh, 590. The sweet orange.

Var. 2, Bigaradia. Petiole usually winged, flowers larger and more strongly scented, rind very aromatic, pulp bitter. Brandis, l. c., 53. *C. vulgaris*, Risso; *C. buxifolia*, Poir. Wight and Arnott describe its oil vesicles as concave, in contradistinction to *C. Aurantium*, in which they are convex. This variety does not seem to be cultivated in India, except in gardens. The bitter or Seville orange.

Var. 3, Bergamia. Flowers small very sweet-scented, fruit globose or pyriform, rind smooth pale yellow, pulp acidulous with pleasant aroma. Brandis, l. c., 54. *C. Aurantium*,

var. *Bergamia*, W. et A., Prodr., 98. *C. Limetta*, var., D. C., Prodr., i., 539. Rarely cultivated in India. The bergamotte orange. Hooker, Fl. Ind., I., 515, and Brandis, 53.

The sweet orange is the form most usually cultivated, and there are several local varieties, some named after the localities in which they are produced, and others according to specific local distinctions in size or flavour. The three more common varieties cultivated in the plains are the *sangtara*, *ndrangi*, and *kaunla* or *kumla*. The last is the smallest and most esteemed. The oranges grown at Delhi and Nágpur are especially prized, and are imported into these provinces. Oranges are cultivated all over the plains of these provinces and in the hills; the best are found in the low valleys in the east of Kumaon. The bitter or Seville orange occurs at Lucknow, but the bergamot is apparently unknown. The orange has been found wild or apparently wild with unwinged petioles at Bágeswar in Kumaon (Str. and W.) and with globose fruit, naked or margined petioles, and oblong-lanceolate, acuminate leaves in Garhwál (T. T.)

Feronia Elephantum, Correa. Elephant apple, wood-apple. *Bil n*, *kait*, *kaiitha*, *kathbel*.

Belonging to the same natural order as the preceding. A small deciduous glabrous tree; spines straight, strong, axillary. Leaves alternate, imparipinnate; leaflets opposite, sub-sessile, quite entire; petiole winged or not. Flowers in terminal or lateral loose panicles or racemes, polygamous. Calyx small, flat, 5-toothed, deciduous. Petals 5, rarely 4-6 spreading, imbricate. Stamens 10-12, a few sometimes imperfect, inserted around a short disk, filaments dilated, sides and front villous, tip subulate; anthers linear-oblong. Ovary oblong, 5-6 celled, at length 1-celled; style 0, stigma oblong fusiform deciduous; ovules 8, crowded in many series upon 5-6 at length parietal placentas. Fruit large, globose, 1-celled, 8-seeded, bark woody rough. Seeds buried in pulp, oblong, compressed; cotyledons thick, fleshy, radicle pointing away from the hilum. Hooker, Fl. Ind., I., 516; Roxburgh, 374; Drury (U. P.), 220; Brandis, 59.

The pulpy part of the fruit which assimilates closely to the *bel*, but is more terebinthinate in flavour, is edible and is also made into a jelly resembling that from black currants, but with a more astringent taste: ripens in October. The tree also yields a gum which is used as a substitute for gum-arabic in medicinal preparations (see *Gums*). The fruit and young leaves are used in medicine (see *Drugs*). Occurs wild in the Bhábar of Kumaon, and is cultivated in the plains.

Egle Marmelos, Correa; *Feronia pellucida*, Roth.; *Crataeva Marmelos*, Linn.; *C. religiosa*, Ainslie not Vahl.—Bael or bel—*Bel*, *bela*, *bil*, *sripal*.

Belonging to the same natural order as the preceding. A small deciduous glabrous tree; spines 1" straight strong, axillary. Leaflets 3-5, ovate-lanceolate, lateral, sessile, terminal long-petioled. Flowers 1½" diam., greenish white, sweet-scented; pedicels and calyx pubescent. Filaments sometimes fascicled. Fruit 2-5" diam., globose oblong or pyriform, rind grey or yellow, pulp sweet, thick orange-coloured. Hooker, Fl. Ind., I., 517; Drury (U. P.), 17; Roxburgh, 428; Brandis, 57.

Occurs wild and cultivated in the lower Himálaya and the plains. The fruit is roundish or sub-spherical, about the size of a large orange, smooth with a hard

woody rind ; 10-15 celled, the cells containing besides the seeds a large quantity of an exceedingly tenacious transparent mucus, having a mild, terebinthinate, not ungrateful smell and taste. It contains tannic acid, an essential oil, a bitter principle and a balsamic principle resembling in odour the balsam of Peru. The fruit ripens in October-November, and is used as a cooling drink in fevers, and the dried pulp (*bel-giri*) in preparations as a specific in a tonic, diarrhoea and dysentery (see *Drugs*). The fruit is nutritious and is occasionally administered fresh as a mild laxative. The mucus is also used as a mixture in mortar. The root, bark, and leaves have also medicinal virtues, and the rind of the fruit yields a yellow dye (see *Dyes*). The flowers yield a perfume by distillation.

Garuga pinnata, Roxb. ; *G. madagascariensis*, D. C. *Kilmira*, *kitmira*, *kharpat* (Kumaon), *karolu'ghogar*, *kaikar* (Oudh).

Belonging to the natural order *Burseraceæ*. A tree 30-40 feet. Leaflets ovate obtusely acuminate oblique crenate ; leaves 1' or more, pubescent when young, afterwards glabrous. Panicle very large, compound, pubescent. Calyx-teeth ovate, pubescent. Petals linear, inserted between the calyx-teeth. Disk completely clothing the tube of calyx. Stamens about as long as the petals. Ovary ovoid, narrowing into the hairy style ; stigma capitate, 5-lobed. Drupe black, "size of a gooseberry." Hooker, *Fl. Ind.*, I., 529 ; Brandis, 62 ; Roxburgh, 370.

Occurs wild along the base of the Himálaya from the Jumna to the Sárda and also in the plains. The fleshy, smooth, black drupe is eaten either raw or pickled : it ripens in June-July in the Bhábar. This tree also yields a gum (see *Gums*) and a tanning substance from the bark (see *Tans*). The shoots and leaves are collected for fodder.

Zizyphus Jujuba, Lamk. ; *Z. mauritiana*, Herb. ; *Z. Sororia*, Schult. ; *Z. trinervius*, Roth. ; *Rhamnus Jujuba*, Linn.—*Badara* (Sansk.), *ber*, *bera*.

A tree belonging to the natural order *Rhamnææ* and sub-order *Zizyphææ*. A small tree 30-50 feet ; young branches and flowers covered with a dense fuscous tomentum. Prickles solitary and straight, or geminate and then one shorter and recurved. Cymes $\frac{1}{2}$ " long. Calyx glabrous within. Petals subspathulate, very concave, reflexed. Disk of 10-grooved lobes. Ovary 2 celled ; styles 2, united to the middle. Fruit globose, 2 celled, fleshy and mealy, glabrous. There are many cultivated varieties, differing greatly in the shape and size of the leaves, as also in the size and nature of the fruit, of which the most remarkable is Edgeworth's var. *Hysudricus* (Journ., Linn. Soc., VI, 201), with erect or spreading not drooping branches, obtuse ovate oblong or orbicular leaves, glabrous or slightly tomentose beneath, and long petioles. This, according to Aitchison, is always raised by grafts. Two other varieties are described by Edgeworth, viz., *hortensis* and *spontaneus*. Hooker, *Fl. Ind.*, I., 632 ; Brandis, 86 ; Roxburgh, 304 ; Drury (U. P.), 466.

Yields a sweet, edible, mealy fruit, ripening from December to March. Occurs wild along the base of the Himálaya and is cultivated all over the plains and in the hills. The sacred shrine of Badarináth in Garhwál is named after this species. The root, leaves and fruit are all used in native medicine (see *Drugs*), the bark for tanning, and the lac collected from the tree as a dye.

Zizyphus vulgaris, Lam.; *Z. flexuosa*, Wall.; *Z. nitida*, Roxb.; *Z. sativa*, Gærtn.—*Sinjill, kandiart, ber, kál-phal*, with varieties *khatis, ghuter, beri* (Bijnor).

Belonging to the same natural order as the preceding. An armed shrub or small tree with rigid spreading boughs and stiff branches which are often unarmed, the whole plant quite glabrous. Prickles usually geminate, the straight one often over 1" long, stout. Leaves $\frac{3}{4}$ -2 $\frac{1}{4}$ " sub-obliquely ovate, obtuse or subacute, crenate-serrate, glabrous on both sides. Flowers few, fascicled in the axils of the leaves; petals cucullate; disk thin, obscurely 5-lobed; ovary 2-celled; styles 2, united to the middle. Fruit $\frac{1}{2}$ " in diameter, globose or oblong, succulent, red or black, shining. Hooker, Fl. Ind., I., 634; Brandis, 85; Roxburgh, 204; Drury (U. P.), 466.

Cultivated in gardens in the plains for its fruit, also wild (?) and cultivated in the hills. The fruit ripens from September to February, and has a pleasant sub-acid flavour. It is eaten raw or dried and carefully cultivated, and preserved varieties fetch a good price and are very palatable and nutritious. The leaves are used as fodder. The varieties of this species cultivated in these provinces are very numerous, and some have more than a local reputation and are exported.

Zizyphus nummularia. W. et A.; *Z. Lotus*, Lam.; *Z. microphylla*, Roxb.; *Z. rotundifolia*, Lam.; *Rhamnus nummularia*, Burmann.—*Jhár-ber, jánd, kánta-ber*.

Belonging to the same natural order as the preceding. A shrub with widely divaricating flexuous branches; young branches puberulous, profusely spined. Leaves $\frac{1}{2}$ -1", ovate to orbicular covered with a short velvety tomentum on both sides, serrate, dark green and velvety above, pale and more felted beneath. Cymes under half an inch; petals obovate with convolute margins. Disk 10-lobed with a pit opposite each lobe. Ovary 2-celled; styles 2, united to above the middle. Fruit $\frac{1}{2}$ " in diameter, globose, woody, black, 2-celled. Hooker Fl. Ind., I., 633; Brandis, 88; Roxburgh, 206.

Commonly planted as a fence and for its sweet sub-acid fruit, which, especially in Bundelkhand, forms an important part of the food resources of the population. The fruit (*pála*) ripens from November to January, and the leaves are used as a fodder for sheep and goats. In the famine of 1868-69 this berry supported life in thousands of the poorer classes. The fruit is abundant and nutritive, and boiled in milk makes a fair tart.

Zizyphus Cœnopia, Mill.; *Z. albens*, Napeca, and *scandens*, Roxb.; *Z. celtidifolia*, D. C.; *Z. ferruginea*, Heyne; *Z. pallans* and *pedicellata*, Wall.; *Z. rufula*, Miq.; *Rhamnus Cœnopia*, Linn.—*Siyákhál*, the *maho* and *bamolan* of Bijnor.

Belonging to the same natural order as the preceding. An armed shrub with straggling often climbing branches, the young ones strigose or oftener covered with a rust-coloured pubescence. Leaves 1-2 $\frac{3}{4}$ " by $\frac{1}{2}$ -1" very obliquely ovate-lanceolate with a short soft pubescence above and long silky oppressed hairs beneath, crenate-serrate. Prickles solitary very short, recurved. Cymes under half inch long; flowers glabrous within; petals obtriangular, cucullate; ovary 2-celled; styles 2 united above the middle. Fruit $\frac{1}{2}$ " in diameter, 1 rarely 2-celled, black, shining, globose or obovoid; stone woody or bony. Hooker, Fl. Ind., I., 634; Brandis, 86; Roxburgh, 204.

Occurs frequently in Kumaon, Rohilkhand, Bundelkhand and the Oudh forests. The fruit is eaten raw and ripens in the rainy season. Besides these we have

Z. xylopyrus, Willd.; the *kathber*, *ghotiya*, *kakmoa*, *chitaniya*, *ghwet* or *sitaber* of these provinces, the leaves and branches of which are used as fodder (Brandis, 90; Hooker, *l. c.*, 634): *Z. rugosa*, Lam.; the *dhaura* and *dhauri* of Bahraich and Gonda, of which the fruit is eaten, but, according to Brandis, has a peculiarly mawkish taste (Brandis, 89; Hooker, *l. c.*, 636) and *Z. oxyphylla*, Edge., the *gigar* of these provinces, but rare in Kumaon and the outer ranges, of which the fruit is eaten, but is very acid (Brandis, 85; Hooker, *l. c.*, 634). All the above are wild and are not cultivated.

Hovenia dulcis, Thunb; *H. acerba*, Lindl.; *H. inaequalis*, D. C.—The *chamhūn* of the Panjāb.

A tree belonging to the natural order *Rhamneæ* and sub-order *Rhamneæ*. An unarmed tree 30 feet; trunk straight; head broad, rounded. Leaves alternate, sub-bifarious, 4-6" by 2-3" ovate-acuminate, deeply and sharply serrate or nearly entire, membranous, glabrous or more rarely pubescent, 3-nerved at base, the midrib pinnately branched. Flowers in pedunculated, dichotomous, many-flowered, axillary and terminal cymes. Calyx 5-fid; tube broadly obconical. Petals 5, inserted below the disk, clawed, cucullate. Stamens 5, a little longer than the petals. Disk lining the calyx-tube, the margin free and hairy. Ovary conical, sunk in disk, 3-celled; style 3-cleft, branches straight, erect. Fruit with arching thickened pedicels, the size of a pea, indehiscent, obscurely 3-lobed, 3-celled, 3-seeded, the outer covering coriaceous and separating from the inner membranous endocarp. Hooker, *Fl. Ind.*, I., 640; Brandis, 94; Roxburgh, 211.

Cultivated occasionally in Kumaon for its sweet fleshy peduncles which are eaten in curries or alone and have a pleasant flavour like that of a bergamot pear. The fruit ripens in July. Wild near Mussooree (Royle).

Sageretia oppositifolia, Brongn.; *S. filiformis*, G. Don; *Rhamnus filiformis*, Roth.; *R. parviflorus*, Klein; *R. trigynus*, Don.; *Zizyphus oppositifolia*, Wall.—The *aglaia* of Kumaon.

Belonging to the natural order *Rhamneæ*. Armed with short spinescent branchlets. Leaves short-petiolate, silky-tomentose when young, glabrous afterwards, coriaceous, ovate-oblong, acuminate, serrate, 2-4" long, with 4-8 pairs of lateral, arcuate nerves. Flowers in terminal panicles and lateral racemes, ramifications covered with short pubescence. Bracts 3-10 under each cluster, ovate, brown, ciliate. Calyx-lobes brown, persistent. Drupe turbinate, not lobed, ½" long, black when ripe. Brandis, 95; Hooker, *Fl. Ind.*, I., 641.

Occurs wild on the outer Himālaya 2-6,000 feet. The black succulent fruit ripens April to June and is eaten by all classes unripe; it is also made into a *chatni*.

Vitis vinifera, Linn. The vine.—*Angūr* (grapes).

The vine belongs to the natural order *Ampelidæ* and is cultivated in gardens for its fruit both in the hills and plains. The heavy rains in these hills are, however, unfavourable to its growth. Throughout the plains the vine fruits well in every district, those raised at Agra, Allahabad, Benares, Cawnpore and Lucknow being well known for their excellence. In Kunāor the fruit is called *dikhāng* and the plant *lānang*, and there the vine is extensively cul-

tivated as a field crop and ripens its fruit at an elevation of from 6—9,000 feet. Cleghorn writes of Kunáor:—"The first plants are seen at Nachár, but the climate there is not suitable; beyond the Miru ridge, which intercepts the heavy clouds, the smaller amount of rain favours the ripening of the grapes. The vineyards occupy sheltered situations generally on the steep slope facing the river. The vines are supported on poles three or four feet from the ground connected by horizontal ones. The fruit hangs below the shade of the leaves, never exposed to the sun. A considerable portion of the crop is dried on the housetop and stored as raisins for winter use, but without care, and many grapes are spoiled in the process. For several years the crop has been deficient, the grapes dropping off before they were ripe from unseasonable falls of rain and snow. In the year 1864 the rainfall was moderate, but the *oidion* or vine disease appeared in the valley and destroyed many vineyards. The fresh fruit is exported to Simla for sale in *kiltas* or large hill baskets, and the small seedless grapes dried are also sold." Also a spirit called *rak* or *ark* is prepared from the juice and a wine called *sheo*. For description see Brandis, 98 : Hooker, Fl. Ind., I., 652.

Vitis lanata, Roxb. ; *V. cordifolia*, Roth ; *V. indica* and *pentagona*, Hb. Ham ; *V. Heyneana*, D. C. ; *V. rugosa*, Wall. ; *V. Labrusca*, Linn —The *asaujiya*, *pahár-phuta*, and *purain* of Kumaon.

A plant belonging to the natural order *Ampelideæ*. A very variable plant in the size, shape, and vestiture of the leaves; usually they are 3-6" by 1½-3", sometimes larger, and usually softly pubescent, but sometimes felted beneath or nearly glabrous. Flowers small, green, forming at hyssoid paniculate cyme. Petals cohering at the apex, rarely separating. Fruit, the size of a large pea, round, purple, 4-seeded. Seed $\frac{1}{2}$ by $\frac{1}{4}$ ", obtriangular, submarginate, rounded and smooth on the back with a small spatulate tubercle, face wedge-shaped with a shallow linear depression on each side of the ridge. The following varieties may be distinguished:—

Var. 1, *rugosa*. Leaves ovate or cordate-ovate, nearly 2 feet, clothed beneath with a dense matted tomentum; stems thicker than in the type with a dark deciduous bark. Himálaya and Tenasserim.

Var. 2, *glabra*. Leaves almost quite glabrous; stems more slender than in the type approaching *V. parvifolia* Garhwál and Khaasá Mts. Hooker, Fl. Ind., I., 651., Drury F. P. I., 178 : Roxburgh, 222.

Common in the outer Himálaya of Kumaon and Garhwál. *Asaujiya* or *pahár-phuta* is the name of Var. *rugosa*, Wall., in Kumaon, the grapes of which are edible and ripen in September-October, hence the first vernacular name. The grapes of the *purain* (*lanata* proper) are small, about the size of a black currant, and are unpalatable.

Æsculus indica, Colebr.—Indian horse-chestnut ; *Pánkar*.

A tree belonging to the natural order *Sapindaceæ*. A fine tree of 60-70 feet in height and 10-15 in girth, with glabrous terete branches. Leaves glabrous; leaflets unequal, the terminal one 5-9" by 1½-3", the lateral ones smaller; common petiole 3-6" thickened at the base,

sulcate above; petiolules ranging to $\frac{1}{2}$ ". Calyx tubular, $\frac{1}{2}$ " long, frequently splitting as the flowers open; lobes short, rounded. Petals 4, white with red and yellow, the place of the fifth vacant. Capsule ovoid or subpyriform, reddish-brown, without spines, rather rough, $\frac{1}{2}$ - $\frac{1}{2}$ " long. Seeds dark. Hooker, Fl. Ind. I, 675; Brandis, 103.

Common in the Himálaya from the Jumna to the Sárda. Flowers appear in April and May, and the fruit ripens during the rains. The seeds are first steeped in water for some time, and then ground up and mixed with meal and flour and used as food by the poor, but only in seasons of scarcity.

Nephelium Lit-chi. Camb.; *Sapindus edulis*, Ait.; *Euphoria punicea*, Lam.; *Dimocarpus Lichi*, Lour.; *Scytalia chinensis*, Gærtn.; *S. Litchi* Roxb.; *E. Lit-chi*, Juss.; *N. dimocarpus*, Herb. The lichi of Europeans and natives.

A tree belonging to the natural order *Sapindaceæ* and tribe *Sapindeæ*.

Introduced from China and extensively cultivated for its fruit in European and native gardens in the plains. It flowers in January and matures its fruit in June. There are two varieties, the rosy pink or *sarkh* and the pale-coloured or *safed*, both of which thrive remarkably well in the Benares, Meerut, and Rohilkhand divisions. For description see Hooker, Fl. Ind., I, 687.

Semecarpus Anacardium. Linn. f.; *S. latifolius*, Pers.; *Anacardium latifolium*, Lam.; *A. officinarum*, Gærtn.; Marking-nut tree. *Bhilawa*, *bhala*, *bhela*.

Belonging to the natural order *Anacardiaceæ* and tribe *Anacardiæ*. A moderate sized diœcious deciduous tree, exuding a dark juice; young parts petioles; leaves beneath and panicle clothed with a fine pale pubescence. Leaves 9-30" by 5-12", very coriaceous, flat, margin cartilaginous, rarely linear-oblong, usually contracted below the middle; nerves 16-25 pairs, stout, slightly arched; petiole 1-2", rounded, not winged. Panicle equalling or shorter than the leaves, stout; branches spreading; bracts lanceolate. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ " diam., subsessile, fascicled. Petals much longer than the calyx, oblong, greenish-white. Filaments subulate. Drupe 1" long, obliquely ovoid or oblong, smooth, shining, black; cup orange-red. Hooker, Fl. Ind., II, 31; Brandis, 124; Roxburgh, 260; Drury (U. P.), 401.

Common in the Kumaon Bhábar and ascending the hills to 3,500 feet; found also in most districts of the plains. The fruit ripens from November until February. The edible fleshy receptacle on which the seeds rest is of a yellow or orange-red colour, and when fresh is somewhat acrid, but roasted it has the flavour of a roasted apple and dried that of a date. The kernel is seldom eaten. The leaves serve as plates, and the green fruit pounded into a pulp or the oil of the seeds mixed with the milky juice of *Euphorbia* make bird-lime. The black acrid juice of the nut-shell is used as a varnish and a dye when mixed with lime-water. This juice and the oil expressed from the kernels are also employed in native medicine (see *Drugs*). * Pharm, 60.

Mangifera indica. Linn.; *M. domestica*, Gærtn. Mango.—*Am, amb* (Bundelkhand), *and* (parts of Bundelkhand); *cháta* (the juicy) and *madha-dát* (messenger of spring), Sansk.

A tree belonging to the natural order *Anacardiaceæ*. A large tree, glabrous, except the panicle; branches widely spreading. Leaves 6-16" very variable in breadth, crowded at the

ends of the branches, acute, acuminate or obtuse, shining, nerved, quite entire, margins often undulate; petiole 1-4" swollen at the base. Panicles a foot and more, pubescent, rarely glabrate; bracts elliptic, concave. Flowers yellow, odorous, subsessile, rarely pedicelled, and on the same panicle. Sepals ovate, oblong, concave. Petals twice as long, ovate, ridges 3-5, orange. Disk fleshy, 5-lobed. Stamen 1, inserted upon the disk, filament subulate; anther purple. Ovary glabrous. Drupe 2-6" compressed, yellow. Hooker, Fl. Ind., II., 14; Brandis 125; Roxburgh, 215; Drury (U. P.), 294.

Said to occur wild in the sub-Himálayan tract from Kumaon to the Bengal frontier, the Khasiya hills and Sikkim, but is cultivated all over these provinces and in the Dúns. Flourishes in the Kota Dún of Kumaon, where there are extensive groves. The flowers (*baur* or *mol*) appear according to locality, February-April, and the fruit ripens from May to July. The grafted varieties cultivated in these provinces have a delicious aromatic flavour, and are equal to any grown elsewhere. The Bombay variety ranks first, next the Málda, and then several local (*desi*) varieties known under different local names. When as big as a pea the fruit is called *tikora*, and until the kernel is formed *kairi*. From the latter mango-fool is made, or *chatni* by adding salt and spear-mint. The unripe fruit is pickled (*achhár*) or made into tarts and mango-fool (*gúrámbe*), and the kernels (*guthali*) are also ground into meal and mixed with various ingredients to form the relish known as *ám-lhatdi*. In times of scarcity the kernels are boiled and eaten with greens. The kernels stuffed with coriander, turmeric, and other spices and boiled in mustard-oil are esteemed a great delicacy. In the pulp of the fruit there is sugar, gum, and citric acid, and in the kernel gallic acid and stearic acid. The ordinary (*desi*) mango has a very turpentiney flavour and is very stringy, but the same stock when grafted bears excellent fruit. The leaves, make tooth-brushes and the stalks are used in lieu of *pán*. The bark, leaves and fruit are officinal in native medicine. The gum from the stem is also used as a substitute for gum-arabic, and a fleeting green dye is obtained from the bark.

Buchanania latifolia, Roxb.; *Spondias elliptica*, Rottler.—*Piyál*, *márya*, *kath-bhildwa* (Garhwál and Kumaon); *piydr*, *paira* (Oudh); *chironji* (kernel of the fruit).

A tree belonging to the natural order *Anacardiaceæ*. Grows 40-50 feet high, sub-deciduous; branchlets as thick as the finger. Leaves 6-10" very coriaceous or hard, nerves 15-20 pairs, stout, nearly straight; petiole 1-1½" stout, pubescent. Panicles terminal and axillary, shorter than the leaves, pyramidal, branches stout, bracts small, caducous. Flowers ½" diam., sessile, greenish white. Calyx 5-toothed. Petals oblong. Disk fleshy. Stamens 10, spreading, as long as the petals. Ovaries 1 perfect, conical, pubescent, 4 others reduced to filaments. Drupe ½" subglobose, slightly compressed, black; stone hard, 2-valved. Hooker, Fl. Ind., II., 23; Brandis, 127; Roxburgh, 365; Drury (U. P.), 89.

Common in the *sál* forests of Garhwál and Kumaon and in the valleys of the lower hills, occurs also throughout the plains, and in Bundelkhand. The fruit ripens in April-May. The kernels are an article of export under the

name *chironji*, and are used as a substitute for almonds in native confectionery and cookery. They are also roasted and eaten with milk. The fruit itself has a sweetish sub-acid (*khatta-mitha*) flavour, and in some places forms no unimportant part of the food resources of the people. The leaves are used as plates, and a gum is yielded by cutting the stem and is used in medicine and the arts. The bark is used in tanning. From the nut-shells a black varnish is obtained similar to that noted under *S. Anacardium*, and from the kernels a clear oil of a pale straw colour used in perfumery in the Peninsula.

Spondias mangifera, Willd. ; *S. amara*, Lam. ; *Evia amara*, Comm. ; *Mangifera pinnata*, Koenig. Hog-plum,—*Amra* (Kumaon), *amūr*, *bahamb*, *amara*, and *amabāra* (Bhābar).

A tree belonging to the natural order *Anacardiaceæ*. A small tree, everywhere glabrous. Leaves 1-1½ feet; petiole slender; leaflets 2-9 by 1-4", shortly petiolulate, shining, more or less oblique; nerves 10-30 on each side, horizontal, joined by a strong intra-marginal one. Panicles large, spreading, sparingly branched. Flowers ¼" diam., scattered, uni. or bisexual. Calyx 5-toothed. Petals oblong, greenish-white. Disk broad, 10-toothed. Filaments short, subulate. Drupe 1½-2" long, yellow, smooth; fresh, very austere; stone cavernous, usually with 1 (1-3) perfect seeds. Hooker, Fl. Ind., II., 42; Brandis, 128; Roxburgh, 387; Drury (U. P.), 415.

Common in dry forests, especially in the Kumaon Bhābar, but occurs in most districts of the plains half-cultivated. Fruit ripens December to February. The yellowish-green fruit, though having a very turpentine, sub-acid flavour, is eaten when ripe and is pickled unripe, and resembles a bad mango of the *desi* variety. A mild insipid gum exudes from the bark. Deer and cattle eagerly feed on the fruit. The leaves, bark, and root are used in native medicine (see *Drugs*).

Moringa pterygosperma, Gærtn. ; *M. oleifera*, Lam. ; *M. seylunica*, Pers. ; *M. polygona*, D C. ; *Hyperanthera moringa*, Vahl. ; *H. decandra*, Willd. ; *Guilandina Moringa*, Linn. Horse-radish tree.—*Sahajna*, *senjna*, *sūjna*.

A tree belonging to the natural order *Moringeæ*. A small tree, bark corky, wood soft, root pungent, young parts tomentose. Leaves 1-2 feet, usually 3-pinnate; petiole slender, sheathing at the base; pinnae 4-6 pairs; leaflets 6-9 pairs, ½-¾" opposite, pale beneath; petiolules slender; glands linear, hairy. Panicles spreading, bracts linear. Flowers pedicelled, 1" diam., honey-scented. Sepals linear-lanceolate, reflexed. Petals narrowly spatulate. Fertile filaments, villous at the base. Ovary hairy. Pod 9-18" pendulous, 9-ribbed. Seeds 8-gonous, winged at the angles. Hooker, Fl. Ind., II., 45; Brandis, 129; Roxburgh, 360; Drury (U. P.), 309; Birdwood, 149.

Cultivated throughout the plains and lower hills, wild in the sub-montane tract. Flowers between January and April, pods ripening from April onwards. The pods are used in vegetable curries and as a pickle, which is very unpalatable to European tastes, and the bark of the roots as a substitute for horse-radish. The leaves and flowers are also eaten. A mild gum of the tragacanth order exudes from the stem and is used in medicine. The root,

bark, and leaves are also used in medicine (see *Drugs*). Pharm, 61. The seeds were formerly known as *Ben nuts*, from which the Ben-oil of jewellers and watchmakers is made, but this oil is derived from a species with unwinged seeds, the, *M. aptera*, Goertn., of Africa. The oil expressed from the seeds of the local species is only used in native medicine as an application in rheumatism. In Jamaica it is said that the wood yields a blue dye.

Bauhinia malabarica, Roxb. ; *B. tomentosa*, Wall. ; *Preostigma malabarica*, Benth.—*Amli*, *amlosa* (Oudh).

A tree belonging to the natural order *Leguminosæ* and tribe *Bauhinieæ*. An erect low bushy tree. Leaves 7-9 nerved, slightly cordate, deeply bifid, broader than long, rigidly coriaceous, with two obtuse lobes reaching about a quarter down, glaucous, subglabrous or finely grey-downy beneath. Racemes sessile, dense, axillary, as broad as long ; pedicels ascending, very slender, $\frac{1}{2}$ -1" long. Calyx clothed with pale brown down ; tube cylindrical, turbinate, $\frac{1}{2}$ - $\frac{3}{4}$ " limb $\frac{1}{2}$ " Petals oblong-spathulate, little exerted. Pod 1 foot by $\frac{1}{2}$ -1", nearly straight, firm, glabrous, rather turgid, reticulate-venulose, rostrate with the style, 20-30-seeded ; stalk 1" long. Hooker, Fl. Ind., II., 277 ; Brandis, 159 ; Roxburgh, 345.

Occurs in the forests along the foot of the Himálaya from the Ganges to Assam. The acid leaves are eaten both as a salad and cooked.

Bauhinia variegata, Linn. ; *B. purpurea*, Wall. ; *B. candida*, Roxb. ; *Phanera variegata*, Benth.—*Kachnár*, *khairwál*, *gárial*, *bariál*.

Belonging to the same natural order as the preceding. General habit like *B. purpurea*, ecirrhone. Leaves 9-11 nerved, pubescence grey, rather broader than deep, middle-sized, rigidly subcoriaceous, deeply cordate, the obtuse lobes reaching $\frac{1}{2}$ - $\frac{3}{4}$ down. Corymbs few-flowered, lateral, sessile or short-peduncled ; bracts minute, deltoid ; pedicels erecto-patent, $\frac{1}{2}$ - $\frac{3}{4}$ " Calyx-tube $\frac{1}{2}$ -1" ; limb cordate ovate, remaining to the end spathaceous and entire. Petals $1\frac{1}{2}$ -2" long, an inch or more broad, white, beautifully variegated with red and yellow, sometimes pure white (*B. candida*, Roxb). Stamens 3-5. Ovary with a long stalk and style and a minute stigma. Pod $\frac{1}{2}$ -1" long, $\frac{1}{2}$ -1" broad, hard, flat, glabrous, rather decurved, dehiscent. 10-15 seeded. Hooker, Fl. Ind., II., 281 ; Brandis, 100 ; Roxburgh, 344 ; Drury (U.P.) 74.

Occurs wild in most parts of these provinces, common in the valleys between the Kosi and the Sárda in Kumaon. Cultivated throughout the plains for its flowers, which appear in February-April. The leaves and flower-buds (*kachnár-ki kalli*) are eaten as vegetables and the young buds are also pickled. The bark is used in tanning and dyeing and the root, bark, flowers, and fruit are used in native medicine (see *Drugs*).

Bauhinia purpurea, Linn. ; *B. triandra*, Roxb. ; *B. coromandeliana*, D. C. ; *Phanera purpurea*, Benth. *Khairwál* ; *khwairál*, *kaniyár*, *kandan*, *kwilar* (Oudh), *gárial* and *kachnár* (Bijnor).

Belonging to the same order as the preceding. A middle-sized erect tree, with moderately stout glabrescent branches, ecirrhone ; leaves 9-11 nerved, pubescence grey, rigidly subcoriaceous, glabrous, shallowly cordate, the lobes obtuse or subacute, reaching $\frac{1}{2}$ - $\frac{3}{4}$ way down. Flowers in terminal and axillary short-peduncled few-flowered corymbs ; bracts minute, deltoid ; lower pedicels $\frac{1}{2}$ - $\frac{3}{4}$ " Calyx-tube $\frac{1}{2}$ - $\frac{3}{4}$ " ; limb $\frac{1}{2}$ -1" in coriaceous, slit into two valves, which show a division into 5 teeth. Petals oblanceolate, with a long claw, reddish, twice the calyx. Fertile stamens 3-4. Ovary grey downy, with a long stalk and style and

moderately large oblique stigma. Pod $\frac{1}{2}$ -1' by $\frac{1}{2}$ -1" firm, flat, glabrous, late in dehiscing, rather decurved, 12-15 seeded. Hooker, Fl., Ind., II., 284 ; Brandis, 160 ; Roxburgh, 344.

Occurs plentifully in the Upper Bhábar of Kumaon and in most dry forests with sál and bambu. Apparently planted in the plains. Flowers at the close of the rains and pods ripen early in spring. The flower-buds (*kalti*) are pickled and eaten in the plains and the bark is used in tanning and the leaves as a cattle fodder. *B. Vahlii*, W. et A., *máljan*, *málu*, also yields a seed (*toyúli*) which is eaten roasted and tastes like a cashew-nut: common in Kumaon and Oudh forests (Brandis, 161.)

Tamarindus indica, Linn. ; *T. occidentalis*, Gærtn. ; *T. officinalis*, Hork. Tamarind.—*Indi*.

Belonging to the natural order *Leguminosæ* and tribe *Amherstieæ*. A spineless tree. Leaves abruptly pinnate, with 20-40, glabrescent, close, obtuse, opposite, oblong, leaflets. Flowers few together in copious lax racemes at the end of the branchlets ; pedicels articulated at the base of the calyx ; bracts boatshaped, caducous, enclosing the buds. Calyx-tube turbinate ; disk produced some distance above its base ; teeth lanceolate, much imbricated, the two lowest connate. Petals under $\frac{1}{2}$ " long ; only the three upper developed, the two lateral ovate, the upper hooded, the two lower reduced to scales, yellow with red stripes. Stamens monadelphous, only 3 developed, the others reduced to mere bristles at the top of the sheath ; anthers oblong, versatile, dehiscing longitudinally. Ovary many-ovuled, with a stalk adnate to the calyx-tube ; style filiform, stigma capitate. Pod 3-6" by 1" or more ; 3-10 seeded ; ligulate, many-seeded, with a thin crustaceous epicarp and thick pulpy mesocarp. Seeds exalbuminous. A single species. Hooker, Fl. Ind., II., 273 ; Brandis, 163 ; Roxburgh, 530 ; Drury (U. P.), 424.

Cultivated all over these provinces, as far as the foot of the hills, where a few trees may be found, but the fruit does not mature well. Flowers in May-June ; fruit ripens in the cold weather. There are several varieties with sour, sweetish, and red pulp in the pods, all of which are used in preserves, pickles, *chatnis*, or sherbets. The pods contain citric, malic, and tannic acids, besides sugar and mucilage, and may be prepared by throwing hot sugar on them or by laying them alternately with powdered sugar in a jar. These pods are largely exported from India. The stones after being soaked in water are roasted, fried and eaten. The fruit, gum, and leaves are used in medicine : see *Drugs* and *Pharm.* 64, 445. A strong infusion of the fruit mixed with sea salt is used to clean silver. The stones reduced to powder and boiled into a paste with thin glue make an excellent wood cement. An infusion of the leaves gives a red dye and to clothes previously dyed with indigo, a yellow dye.

Cassia Fistula, Linn. ; *C. rhombifolia*, Roxb. Indian laburnum.—*Amalís* (plains), *kitwáli* (Garhwál), *kitola* and *itola* (Kumaon), *sim* and *simhára* (Bijnor) and *warga* (Oudh).

Belonging to the natural order *Leguminosæ*. A middle-sized erect tree, glabrous in all its parts. Leaves a foot or more long ; leaflets 2'-6" long, ovate, distinctly stalked, usually acute, rigidly subcoriaceous, pale green, strongly veined. Racemes as long as the leaves ; pedicels spreading, $1\frac{1}{2}$ -2" long. Calyx $\frac{1}{2}$ — $\frac{3}{4}$ " glabrous, caducous. Petals obovate, shortly clawed, $\frac{1}{2}$ -1" deep. Pod 1-2' long, above an inch thick. Hooker, Fl. Ind. II., 261 ; Roxburgh, 349, Brandis, 164.

Common up to 3,000 feet in Kumaon. Occurs wild and cultivated in plains and hills. I have heard of the very young pods being eaten in curries, but this requires confirmation.

Rosaceæ.

There are several species of wild and cultivated fruit trees belonging to the natural order *Rosaceæ*, sub-order *Pruneæ* and genus *Prunus*.

The sub-order *Pruneæ* is characterised by :—"Flowers regular. Carpel 1, rarely 2 ; style sub-terminal, rarely basal ; ovules 2, pendulous ; radicle superior.

The genus *Prunus* consists of shrubs or trees. Leaves alternate, simple, quite entire or serrate or crenate or glandular-serrulate, petiole often 2-glandular. Flowers white or red, solitary fascicled corymbose or racemed. Calyx deciduous in fruit ; lobes 5, imbricate. Petals 5. Stamens 15-60, perigynous, inserted in the mouth of the calyx-tube, filaments free. Carpel 1 ; style terminal ; ovules 2, collateral, pendulous. Drûpe with an indehiscent or 2-valved, 1-seeded, smooth, or rugged stone. Seed pendulous, testa membranous or coriaceous, albumen scanty or 0.-Distrib. N. temp. regions, rare in the tropics, species 80. Hooker, Fl. Ind. II., 312.

Sec. I.—*Amygdalus*. Leaves conduplicate in bud. Flowers subsessile drupe usually pubescent ; stone bony rugged.

Prunus amygdalus, Baill. ; *Amygdalus communis*, Linn.. Almond.—*Baddm*.

Leaves appearing after the flowers oblong-lanceolate serrulate, petiole glandular as long as the leaf is broad or longer, stipules fimbriate, flowers peduncled, calyx campanulate, pericarp 2-valved. Hooker, Fl. Ind., II., 312 ; Brandis, 190.

A few trees are cultivated in Kumaon more as specimens in gardens than as a regular fruit crop and have been imported through Aoghâni workmen. The seeds and the oil extracted from the kernels are used in medicine, Pharm. 83

Prunus persica, B. et H. f. ; *Amygdalus persica*, Linn. ; *A. collinus*, Wall. ; *Persica vulgaris*, Mill. ; ? *P. saligna*, Royle. Peach.—*Âru*, *rek*.

Leaves appearing after or with the flowers, oblong-lanceolate, serrate, petiole glandular or not shorter than the leaf is broad, stipules fimbriate, flowers sessile, calyx campanulate, pericarp indehiscent. Hooker, Fl. Ind., II. 313, Brandis, 191.

The nectarine is a form with smooth and the peach with a downy pericarp. Two varieties are cultivated in the plains, the round peach and the *chakaiya* or Chinese variety. In the hills, the usual English varieties have been imported and thrive well in suitable localities. It is completely naturalized in the North-western Himâlaya and in places appears to grow wild. Flowers January-May and fruit ripens May-October, according to locality. Brandis has some observations on its distribution, and notes that the blossom is apt to be killed by excessive frost, and that a small green beetle at times strips the tree of its leaves. Madden states that at Almora the fruit does not ripen nor does it ripen at Naini Tal, but at Dehra it comes to perfection and bears well. The flowers are purgative and the leaves and kernels yield prussic acid on distillation. The fermented fruit gives a brandy much used in America. The bark also yields a gum during the hot season.

Sec. II.—*Armeniaca*. Leaves convolute in bud. Flowers sessile or peduncled. Drupe large, indehiscent, downy; stone bony, smooth.

Prunus armeniaca, Linn. Apricot.—*Chú-áru*, *zard-áru*, *jald-tru*, *kushm-áru*, the *galdam* of Tibet.

Leaves appearing after or with the flowers broadly ovate, acuminate, crenate, petiole glandular, stipules lanceolate, flowers shortly peduncled, calyx campanulate, stone with a thickened, grooved margin. Hooker, *Fl. Ind.*, II., 313; Brandis, 191; Roxburgh, 403.

Commonly cultivated all over the hills up to high elevations and wild to the west. Occasionally grown in the northern Duáb. The Var. *dasycarpa*, Ehr., is the black-fruited apricot of Kashmír, introduced into the North-West Himálaya. Flowers, January-May, fruit ripens June-September, according to elevation. The foliage turns yellow in August and becomes red before falling. Occurs up to very high elevations (13,000 feet), and along the Tons and the Jumna affords a very important food resource. The fruit is there dried and exported to the plains, and an oil is extracted from the kernels which is used in medicine and for perfumery purposes for the hair and as a lamp oil. The oil is clear, of a pale yellow colour, and smells strongly of hydrocyanic acid, of which it contains usually four parts in 100. Many European varieties have been introduced and distributed through the Ránikhet and Mussooree nurseries.

Sec. III.—*Cerasus*. Leaves conduplicate in bud. Flowers solitary fascicled or umbelled. Calyx-tube short or long. Drupe glabrous not glaucous.

a.—*Flowers appearing with the leaves.*

Prunus Avium, Linn.; *P. Cerasus*, a, Brandis, 193. Sweet cherry or gean. *Gilds*, *krusbal*.

Roots without suckers, leaves flaccid drooping oblong-obovate acutely serrate pubescent beneath, petiole long 2-glandular, flower fascicled long-pedicelled, flowering buds leafless, calyx-tube urceolate constricted at the top, lobes entire, petals flaccid spreading almost obcordate, fruit sweet or bitter, stone smooth. Hooker, *Fl. Ind.*, II., 313.

Cultivated up to 8,000 feet, chiefly to the west. Flowers, April-May, fruit ripens June. The fruit is eaten and the kernels in Europe flavour the liqueur called Kirschenwasser. The European varieties introduced have not yet succeeded well, owing to the effect of the heavy rain on the young fruit.

Prunus Cerasus, Linn.; *P. caproniana*, D. C. Acid cherry. *Alu-bdu*.

Roots with many suckers, leaves erect firm shining crenate-serrate glabrous beneath, petiole short eglandular, flowers fascicled long-pedicelled, flowering buds leafy, calyx-tube campanulate not constricted at the top, lobes crenate, petals erect stiff tip rounded, fruit acid, stone smooth. Hooker, *ibid*, 313; Roxburgh, 403; Brandis, 193.

Cultivated up to 8,000 feet, chiefly to the west. Flowers and fruits at the same time as the preceding. The kernel contains hydrocyanic acid and is used for flavouring liqueurs like maraschino. The bark is bitter and astringent

and possesses, febrifugal properties and the gum has some of the virtues of gum tragacanth; see *Gums*. Several varieties from European stocks are cultivated in gardens in Kumaon.

b.—Flowers appearing before the leaves.

Prunus Puddum, Roxb.; *P. sylvatica*, Roxb.; *P. cerasoides*, Don; *Cerasus Puddum*, Wall.; *C. Phoshia*, Ham. Wild cherry.—*Pāya, padam, paddam.*

A large tree, of brilliant appearance in flower, glabrous except the puberulous young shoots. Leaves 3-5 in., variable in length and breadth, often doubly serrate, glabrous; petiole slender, $\frac{1}{2}$ — $\frac{3}{4}$ in, stipules long, subulate, lacinate. Flowers rose red or white, from lateral buds clothed with concave rounded glabrous scales; peduncles $\frac{1}{2}$ —1 in. often subcymose, connate at the base or almost umbellate. Calyx-tube $\frac{1}{2}$ in, glabrous, lobes ovate, acute, quite entire. Drupe oblong or ellipsoid, obtuse at both ends; flesh scanty yellow or reddish, acid; stone bony rugose and furrowed. Allied to the *C. pseudocerasus* of Japan. In Sikkim the ovary is often (from insect puncture) enlarged into a fusiform pale smooth fleshy body 2 inches long, gradually narrowed into the elongate-filiform style. Hooker, *Fl. Ind.*, H. 315; Roxburgh, 493; Brandis, 194.

Wild and cultivated in the North-West Himālaya, 2,500-7,000 feet. The fruit is collected for making the well known hill cherry-brandy, and is also eaten though very bitter. Madden notes (under Bhīm Tāl) that the flowers appear in October-November and the fruit ripens in spring. This tree is common about Almora and on the roads leading to it; it is an evergreen here. He derives the name from the Sanskrit *padmāksha*. 'The eye of the lotus,' in allusion to its pink flowers.

Sec. IV.—Prunus proper. Leaves convolute in bud, appearing after the flowers. Flowers solitary or fascicled. Calyx-tube short. Drupe glabrous, usually glaucous.

Prunus communis, Huds; Var. *insititia*; *P. insititia*, Linn.; *P. bokhariensis* and *P. Alwocha*, Royle. Yellow bullace. *Alu-bukhāra* (blue), *ulecha*, *dlūcha* (yellow), *chhota-dlu* (a small variety).

Shrubby, unarmed or spinous, leaves obovate, ovate or ovate-lanceolate serrulate obtuse acute or cuspidate, nerves hairy beneath, peduncles solitary or in pairs, calyx-tube obconic, drupe globose or ovoid, drooping. Hooker, *Fl. Ind.* II, 315; Brandis, 192.

Madden notes two cultivated varieties about Almora, one a dark blue damson known as *bhotiya-badām*, and the other a larger orange red variety called *ladāk*. The first ripens in July and the second in June, and both may probably be referred to *P. communis*, var. *domestica*, plum or 'prune. Madden styles them "palatable but unwholesome." Many European varieties have been introduced with more or less success.

Sec. V.—Laurocerasus. Leaves conduplicate in bud. Flowers in axillary or terminal many-flowered racemes. Calyx-tube short obconic. Drupe glaucous or not.

Prunus Padus, Linn. ; *Cerasus cornuta*, Royle. Bird-cherry.—*Jamana* of Kumaon:

A small nearly glabrous tree, with young parts sparingly pubescent. Leaves very variable; 4-6 in., usually oblong-lanceolate with a cordate base, serratures often double, very close-set, nerves often with hairs in the axils beneath, under-surface not glaucous; nerves spreading, slightly arched; petiole $\frac{1}{2}$ -1" slender, glands small or 0.; stipules linear, membranous, caducous. Racemes from the axils of fallen leaves or terminating lateral leaf-branchlets, 4-10" long, drooping; peduncle and rachis glabrous pubescent or tomentose; pedicels $\frac{1}{2}$ "; bracts linear, caducous. Flowers white. Calyx-tube hemispheric or turbinate; lobes rounded, obtuse, gland-toothed. Petals orbicular, concave. Drupe acid, the size of a large pea; stone thick, rugged. Foliage red in autumn. Hooker, Fl. Ind., II., 316; Brandis, 194.

Grows wild, 4,000-10,000 feet. The fruit is eaten though insipid and astringent, and is used in the manufacture of liqueurs, and the leaves form an excellent fodder for cattle. Stewart notes that the specific name given to this tree arose from the fact that from the puncture of some insect, the fruit frequently grows into a horn-like dark excrescence up to 3" long. These are occasionally seen in most seasons, and were exceedingly common in parts of Hazára in 1867. Flowers in the hot season, fruits in the rains.

Prunus nepalensis, Ser.; *Cerasus glaucifolia*, and *C. Lindleyana*, Wall.; local names apparently as preceding.

Leaves lanceolate or oblong-lanceolate, acuminate, crenate-serrate, glaucous beneath, nerves 16-20 pairs, base usually acute, petiole eglandular, racemes elongate, drupe glabrous, stone smooth, $\frac{1}{2}$ " in diameter. Hooker, Fl. Ind. II., 316.

Hooker notes that it is very difficult to distinguish this species from *P. Padus* except by the fruit, which is more than twice as large, with a quite smooth thick-walled stone; leaves usually glaucous beneath and acute at the base, serratures far less sharp and more distant; calyx lobes shorter. It is recorded as occurring wild from Kumaon to Sikkim, and I have not been able to procure any local vernacular name for it.

The following species are also recorded from the North-West Himalaya:—

Prunus Jacquemontii, Hooker f.; *Amygdalus humilis*, Edge.; occurs in the Dhauti valley in Garhwál at Malári and Níti: Hooker, l.c., 314; Brandis, 194: grows wild.

Prunus undulata, Ham.; occurs 6,500-8,000 feet from the Jumna to Bhután; Hooker, l.c. 316; Brandis, 195: grows wild.

Prinsepia utilis, Royle.—*Bhekara*, *bhekala*, the *cherara*, *dhatela* and *jhatela* of Kumaon and Garhwál.

Belonging to the natural order *Rosaceæ* and sub-order *Prunææ*. A shrub 3-5 feet; branchlets green, soft, pubescent when young, pith septate. Leaves 1-5" coriaceous, acuminate, entire or serrate. Flowers quarter inch in diameter, white, usually opening in the autumn. Drupes $\frac{1}{2}$ - $\frac{3}{4}$ " purple, subtended by the withered calyx. Stone coriaceous, smooth; seed erect,

clotyledons amygdaloid, radicle inferior. Hooker, Fl. Ind., II., 322 ; Brandis, 196 ; Royle, Ill. Bot. Him. 206, t. 38. f 1.

The seeds yield an oil used for culinary purposes and for burning. Occurs frequently wild on dry rocks 2,000-9,000 feet in the North-West Himálaya from the Tons to the Sárda. Flowers all the winter : fruit ripens in spring.

Rubus lanatus, Wall. *R. tiliaceus* Sm. of Madden. *Hísálu*.

Belonging to the natural order *Rosaceæ* and sub-order *Rubecæ*, which is characterised by flowers regular, calyx ebracteolate, stamens very numerous ; carpels many ; styles sub-basal or ventral ; ovules 2, collateral, pendulous. Fruit of many dry or fleshy carpels not included in the calyx-tube ; radicle superior

R. lanatus is described as glandular, branches and leaves beneath white cottony, leaves cordate orbicular-ovate acute obscurely lobed serrate glabrous or hairy above, panicles short dense densely villous and covered with gland-tipped hairs, petals small narrowly linear-oblong, carpels numerous. The very broadly ovate cordate obscurely lobed leaves, white cottony tomentum, and above all the long glandular hairs of the young shoots and inflorescence best distinguish this species, which has the other characters of *R. moluccanus*. It may be likened to a dense-flowered glandular *R. paniculatus*, with broader leaves. Hooker, Fl. Ind., II., 331.

Occurs wild in Kumaon 5-8,000 feet, and yields an insipid edible fruit in the spring.

Rubus paniculatus, Smith ; *R. tiliaceus*, Wall. *Kalu-hísálu* (Kumaon), *anchu*, *patharola* (Garhwál).

Belonging to the same natural order as the preceding. A very rambling climber ; all parts except the leaves above densely pubescent or tomentose, with usually cottony white or buff tomentum ; prickles hooked, flattened, *Leaves* 3-5", rarely as broad as long, rather membranous, sparsely hairy above, lateral lobes usually very obscure ; midrib without prickles petiole 1-2", slender, rarely with a prickles ; stipules small, lacinate. *Panicles* very large and open ; bracts small. *Flowers* $\frac{1}{2}$ -1" diam., often long pedicelled. *Calyx-lobes* ovate, acute acuminate or lanceolate and caudate-acuminate ; when they are often incised towards the tip erect in fruit. *Petals* much smaller than the calyx-lobes, white. *Carpels* glabrous. *Fruit* globose, exposed ; drupes many, large, black ; receptacle villous, stone rugose. Hooker, Fl. Ind II., 329 ; Brandis, 196 ; Roxburgh, 409.

This species occurs wild along the North-Western Himálaya 3-7,000 feet, and yields an edible fruit similar to the preceding. Flowers April-June.

Rubus moluccanus, Linn. ; *R. rugosus*, Smith, Don., W. et A., Dal. et. Gib. ; *R. alceaefolius* Poir. ; *R. micropetalus*, *macrocarpus*, and *Fairholmianus*, Gardner ; *R. cordifolius*, Don ; *R. reflexus*, Ker and *R. Hamiltonianus*, Serin. *Katsol*, *kala hísálu* (black variety), *lál-hísál* (red variety).

A very variable species. Stem very robust, with wide spreading subscaudent branches densely clothed with white grey or fulvous tomentum ; prickles hooked, flattened *Leaves* 2-10" diam., most variable in texture and pubescence ; upper surface smooth or covered with tubercles answering to the spaces between the nervules ; under pubescence villous or clothed with cottony wool, grey or green or buff-coloured, never quite white petiole 2-4", glabrate or tomentose ; stipules variable in size, oblong toothe pinnatifid lacinate or pectinate. Inflorescence usually clothed with silky buff tomentum

rarely white or glabrate. Flowers very variable in size, from $\frac{1}{2}$ -1", in rather contracted terminal panicles and axillary capitate clusters; bracts like the stipules, never bearing gland-tipped hairs. Calyx-lobes $\frac{1}{2}$ $\frac{2}{3}$ " long, usually triangular-ovate, rarely lanceolate, and then pinnatifid in the upper part, erect in fruit. Petals obovate, white, shorter than the calyx-lobes. Filaments glabrous. Carpels numerous, glabrous. Fruit globose, succulent, of many scarlet small drupes; receptacle villous; stone rugose. Hooker, Fl. Ind., II., 330; Brandis, 197; Roxburgh, 408.

Hooker in his notice of this plant states that he is "quite unable to arrange the form of this common and protean plant under recognisable varieties answering to its synonymy," and I must therefore refer the reader to his notes on the subject. It appears to be one of the most common species in the North-Western Himálaya, where the fruit is eaten and brought for sale to the hill-stations. It makes a very fair jam.

Rubus niveus, Wall. *R. gracilis*, Roxb.; with its varieties, *R. hypargyus*, Edg.; *R. concolor*, Royle; *R. concolor*, Wall. *Pila hisálu* of Naini Tál, where it occurs on China with red flowers and yellow fruit.

A very variable species. A large rambling bush, without bristles or gland-tipped hairs; very variable in all its parts. Stem stout and branches often purple, young often quite glabrous and glaucous or thickly or thinly tomentose; prickles short, scattered, pale. Leaflets 1-5", entire or lobulate, toothed or crenate, acute acuminate or caudate, terminal sometimes cordate, usually membranous and glabrous, above sometimes (*R. concolor*) green, and glabrous beneath also; petiole slender, 1-2", with usually 1-2 prickles. Flowers $\frac{1}{2}$ -1", diam., usually on slender unarmed pedicels, lower axillary often solitary, upper corymbosely arranged on a long peduncle, nodding; bracts filiform. Calyx-tube short, flat; lobes ovate-lanceolate, quite entire, $\frac{1}{2}$ - $\frac{1}{2}$ ", tomentose on both surfaces, spreading or reflexed in fruit. Petals much smaller than the calyx-lobes. Stamens very numerous. Fruit globose, large or small, of few or many dry or fleshy drupes; stone pitted. Closely allied to *R. lasiocarpus*. Hooker, Fl. Ind., II., 335; Roxburgh, 408.

The species occurs at elevations 6-11,000 feet, and yields a very succulent pleasantly tasted reddish or yellowish-brown fruit, very agreeable with sugar and cream. With regard to the synonymy of this species, Hooker states that he finds it "impossible to arrange satisfactorily the forms of this most puzzling plant," and gives a numerous list of varieties to which I must refer the reader.

Rubus lasiocarpus, Smith: *R. distans*, Don; *R. Horsfieldii*, Miq.; *R. albescens* and *R. roseiflorus*, Roxb.; *R. rotundifolius*, Royle; *R. mysorensis*, and *R. indicus*, Heyne; *R. furfuraceus*, Wall.; *R. bijugus*, Focke. *Kaleri-hisálu*, *kála-hisálu* (black variety), *lal-hisálu* (red variety).

A large rambling very variable plant, branches cylindric, with coloured pruinose bark, the very young only tomentose; prickles compressed, variable in size and curvature, extending to the petioles and rachis, but not or rarely to the inflorescence. Leaves 3-10", leaflets 1-3", rather coriaceous, opaque, glabrous or silky above, almost plaited by the strong straight nerves, which are very prominent beneath, sometimes very acute, often doubly toothed and mucronate, terminal usually broad-ovate, or even orbicular, rounded acute or cordate at the base; lateral sessile, rarely ovate or orbicular; petiole stout, grooved above, glabrous and shining or tomentose; stipules $\frac{1}{2}$ ", linear-subulate. Corymbs axillary and terminal, simple or subpanicled, densely tomentose or villous, or merely puberulous, on short or long (1-2") peduncles, 2-many.

flowered; pedicels long or short; bracts setaceous or filiform. Flowers $\frac{1}{2}$ – $\frac{3}{4}$ " diam. Calyx densely woolly; tube small; lobes ovate or ovate lanceolate, acute, acuminate or caudate, spreading or suberect in fruit; laciniate and much lengthened in Maulmain specimens. Petals deep pink, orbicular or broadly obovate, rarely exceeding the calyx. Fruit $\frac{1}{2}$ – $\frac{1}{4}$ " diam., globose, hoary; drupes numerous, dry, or fleshy, and then red or orange; stone pitted; receptacle columnar, villous. Hooker, Fl. Ind., II., 339; Brandis, 198; Roxburgh, 409.

A very common species in the north-west Himalaya, 2-8,000 feet, occurring at Naini Tál and Almora in abundance. This species, like *R. niveus*, is very difficult to define, and I must refer the reader to Hooker's notes (*l. c.*) on its very numerous varieties. Flowers March-April, and fruit ripens in June-July; excellent and palatable.

Rubus ellipticus, Smith; *R. rotundifolius*, Wall.; *R. Gowry-phul*, and *R. Gowree-phul*, Roxb.; *R. flavus*, Ham.; *R. sessilifolius*, Miq. Kumaon raspberry *Gauri-phal*, *Hsára* (Garhwál), *jogiya-hsálu* (Kumaon).

A variable species, a tall suberect bush; branches stout, spreading and recurved, obscurely angled; hairs red-brown, often very dense, covering a softer down with occasional glandular hairs; prickles stout, hardly compressed. Leaflets 2-4", coriaceous, dark green above, rarely glabrous beneath; petiole 1-3", stipules subulate. Panicles small, many-flowered, pedicels short; bracts setaceous. Flowers $\frac{1}{2}$ – $\frac{1}{4}$ " diam. Calyx densely pubescent and bristly or not; lobes ovate, acute acuminate or obtuse and mucronate, erect in fruit. Petals obovate, larger than the calyx, white. Stamens 1-seriate. Fruit globose, exposed; drupes on a cylindrical hairy receptacle, many, golden yellow, succulent; stone rugose. Hooker, Fl. Ind., II. 336; Brandis, 197; Roxburgh, 408.

This species occurs at elevations 2-7,000 throughout the north-west Himalaya, and yields abundantly a pleasant sub-acid, edible fruit of a yellow colour. Flowers, March, fruit ripens April-May. This species is the most common of all, and in individuals equals all the rest put together. Next in numbers comes *lasiocarpus* and next *moluccanus*.

Rubus nutans, Wall and Edge.; *R. nepalensis*.—*Gangur*, the *sinjung* of the Bhotiyas; its deep orange coloured edible fruit is called by them *sinjang-lho*.

Stems as thick as a sparrow quill, 1-2' long from a woody rootstock; hairs rather stiff, red-brown when dry. Leaflets $1\frac{1}{2}$ –3", long and broad, membranous, glabrous and dark-green above, hairy along the nerves beneath, base cuneate, lateral shortly petiolulate; petiole 2-4"; stipules large, broadly ovate or oblong, entire or toothed. Flowers usually solitary, axillary, $1\frac{1}{2}$ " diam; peduncle stout. Calyx-tube villous, lobes $\frac{1}{2}$ – $\frac{1}{4}$ ". Fruit of few scarlet drupes; stone smooth. Hooker, Fl. Ind., II., 334.

This species occurs at elevations 8-10,000 feet, and there it is very common. It grows on the ground like a strawberry, and yields a fruit having a very pleasant sub-acid flavour. Other edible Kumaon species are—

R. rosæfolius, Sm.; *yeshul*, Hooker, *l. c.*, 341; Brandis, 198.

R. biflorus, Buch.; Hooker, *l. c.*, 338; Brandis, 198.

Fragaria indica, Andr.; *F. malayana*, Roxb.; *F. nilgirica*, Zenker; *F. arguta*, Lindl.; *F. Roxburghii*, W. et. A.; *Duchesnea fragarioides*, Smith; *D. chrysantha*, Miq.; *D. fragiformis*,

Don. ; *Potentilla denticulosa* and *Wallichiana*, Seringe ; *P. Durandii*, T. et. G. ; *P. fragariaefolia*, Klotzsch ; *P. trifida*, Lehm. Indian strawberry. *Kēpaliya*, *bhyāla*.

A very variable plant very slender more or less silkily hairy. *Rootstock* stout, with many long slender prostrate stems. *Leaves* distant; leaflets rarely 5, 1-1½", petiolulate or sessile, membranous, simply or doubly crenate or toothed or serrate, base cuneate entire, nerves parallel; petiole 1-5", very slender; stipules leafy, toothed; leaflets 3-5 obovate serrate crenate or toothed. *Peduncles* solitary, axillary, 1 flowered, very slender, equalling the petioles, naked. *Bracteoles* large cuneate-obovate, 3-5 fid. *Flowers* ½-1", diam. *Calyx-lobes* ovate or lanceolate; bracteoles narrow or broad, often greatly exceeding the calyx-lobes, rarely quite entire. *Petals* obovate, cordate, yellow. *Fruit* spherical or oblong, bright red, spongy, insipid; achenes minute, obscurely pitted. Hooker, Fl. Ind., II., 343 ; Roxburgh, 409.

The indigenous strawberry yields abundantly a very insipid fruit which, however, can be improved by cultivation. The cultivated species is the *F. vesca*, Linn., and its varieties (Hooker, l. c. 344). It does well in the plains and hills where now may be found most of the European varieties. Good strawberries are notably grown at Mirzapur, Lucknow, and Agra in the plains, and at Mussooree, Naini Tal, Rānikhet, Almora, and Binsar in the hills. The stock in the last place was imported by Sir H. Ramsay. The fruit ripens in the hills during April-May and in the plains during the spring, and in good ground with care a very fair crop may be obtained, but nowhere does it equal in flavour the strawberry cultivated in England. *F. vesca* Var. *nubicola* covers all the hills 7,000-10,000 feet with its white flowers in May, and yields a pleasant fruit, eatable with cream.

Cydonia vulgaris, Pers. ; *C. Sumboshia*, Ham. ; *Pyrus Cydoniæ*, Linn. The quince. *Bihī*.

Belonging to the natural order *Rosaceæ*. A bush with black bark. *Leaves* simple, quite entire; stipules ovate, oblique. *Flowers* large solitary, white or pink, woolly; bracts herbaceous, toothed. *Calyx-tube* clavate; lobes large, spreading, toothed. *Petals* 5, contorted in bud, claw woolly or glabrous. *Stamens* 20. *Ovary* 5-celled; styles 5, connate and woolly below the middle; ovules many in each cell, 2-seriate, ascending or horizontal. *Fruit* subglobose, intruded at the base and apex, firm and fleshy, fragrant, 5-celled, cells many-seeded. *Seeds* small, plano-convex, testa mucilaginous. Hooker, Fl. Ind., II., 368 ; Brandis, 205 ; Roxburgh, 406.

Cultivated in the plains of these provinces and in the hills up to 5,500 feet. The fruit ripens June-July, and as a rule the plains-grown is inferior to that produced in the hills, though at Meerut some good varieties are procurable. The quince is usually stewed in tarts or made into jam or preserves but is also eaten dried, fresh or candied. Roxburgh states that this tree has been introduced from Europe and from the Cape of Good Hope. Several European varieties have been distributed from the public nurseries in the hills. The seeds of the quince are used in native medicine: see *Drugs*.

Eriobotrya japonica, Lindl. ; *Mespilus japonica*, Banks. Loquat.

Belonging to the natural order *Rosaceæ*. Branches very robust, and leaves beneath and inflorescence densely softly woolly, leaves subsessile narrowly oblanceolate acuminate, remotely

serrate woolly beneath, petiole very short, fruit ovoid large, intruded at the top. *Branchlets* as thick as the little finger. *Leaves* 6-8 by $1\frac{1}{2}$ -3", thick and stiffly coriaceous; base obtuse or narrowed into the very short stout woolly petiole; nerves 12-15, very prominent beneath. *Panicles* 3-6 in. long and broad; branches very stout. *Flowers* $\frac{1}{4}$ " diam., crowded, fragrant. *Calyx tube* short; lobes ovate, subacute. *Petals* broadly ovate. *Fruit* 1-1 $\frac{1}{4}$ " long, rather narrower, yellow, rarely as many as 5-seeded. Hooker, Fl. Ind., II., 372; Brandis, 575; Roxburgh, 406.

Introduced from China into Bengal and now cultivated all over the plains of these provinces. Fruit ripens in the hot weather. I do not know whether *Mespilus* (*Pyrus*) *germanica*, Linn., the medlar of Europe, is cultivated in these provinces or not. There are two well marked varieties of the loquat, the *sarkh* of a deep apricot colour and the *safed* of a light primrose colour.

Pyrus communis, Linn. The Pear. *Naspāti*, nāh.

Belonging to the natural order *Rosaceæ*. A tree or shrub glabrous or with woolly young parts and inflorescence, young often spinous. Leaves variable in length and breadth of point, oblong ovate acute crenulate or subentire, hardly exceeding the slender petiole, lobed. Corymbs terminating short shoots, short. Flowers $1\frac{1}{2}$ " diameter; calyx-lobes ovate or lanceolate, persistent, variable; petals obovate, white. Fruit 1-2", pyriform, gradually narrowed into the peduncle. Hooker, Fl. Ind., II., 374; Brandis, 203; Roxburgh, 406.

Cultivated for its fruit throughout the Himālaya, 2-8,500 feet. Most of the European forms have been introduced and pears of good quality are now readily procurable in the Naini Tāl market. An insipid woolly variety is occasionally cultivated in the plains, notably in Gorakhpur. Flowers in the spring and the fruit ripens during the rains.

Pyrus Pashia, Ham.; *P. variolosa*, Wall.; *P. verruculosa*, Bertol.; *P. nepalensis*, Herb. *Mehāl*, *mol* (Kumaon), *passi* (Nepāl).

Belonging to the natural order *Rosaceæ*. A deciduous tree, young parts woolly, leaves ovate or ovate-lanceolate, acuminate, crenulate, the young serrulate, with 3-lobed and doubly sharply serrated leaves glabrous or woolly beneath, and often spinescent branches; branches dark, woody. Leaves 2-4", acuminate, sometimes caudate, glabrous and black when dry; petiole slender, half the length of the blade. Inflorescence very variable, usually corymbose, with a very short peduncle and woolly; but the peduncle sometimes very thin, or is all but absent when the flowers are fascicled or umbelled; pedicels $\frac{1}{2}$ " slender in flower, stout in fruit. Flowers 1" diam. Calyx-lobes ovate, acute, usually very woolly, especially externally. Petals orbicular obovate. Stamens about 30. Styles 3-5, quite free, more or less woolly at the base. Fruit very variable in size, $\frac{1}{2}$ -1 $\frac{1}{2}$ " diam., dark yellow-brown; scurfy, covered with raised white spots, austere, eatable when decaying. Hooker, l. c., 374; Brandis, 204.

Occurs wild in the Himālaya of these provinces 2,500-8,000 feet; common in the Sarju valley in Kumaon. The flowers appear in the spring and the fruit ripens in September-December. The fruit is harsh, bitter, and worthless until half rotten, when it can be eaten. The stocks are good for grafting.

Pyrus Malus, Linn. ; *Malus communis*, Desf. The apple tree. *See, sub, sheo*.

Belonging to the natural order *Rosaceæ*, a tree rarely exceeding 30 feet; branches and foliage at length glabrous. Leaves ovate shortly acuminate, crenate glabrous above, tomentose beneath, 2-3"; petiole half the length of the blade tomentose or woolly. Flowers 1½-2" in diameter; calyx densely tomentose, lobes persistent, broad-ovate acute; petals pink with a tomentose claw; styles 5, united below the middle. Fruit large, very shortly peduncled, globose, intruded at both ends. Hooker, Fl. Ind., II., 373; Brandis, 205; Roxburgh, 406.

The apple occurs wild in the hills of these provinces, and most of the European varieties are cultivated. The flowers appear in the spring, and the fruit ripens July-September. Much has been done to extend pomiculture by the establishment of the Mussooree, Chhājauri, Paori, and Rānikhet nurseries, whence thousands of young trees have been distributed all over the hills. In the plains two varieties are cultivated, the '*desi-seo*' or 'country apple' and the '*wilāyati-seo*' or 'introduced apple,' neither of which thrive well in the hot plains.

Pyrus baccata, Linn. ; *P. baccata*, var. *himalaica*, Maxim. ; *Malus baccata*, Desf. The Siberian crab. *Ban-mehal*, *gwāla-mehal* (Kumaon).

Belonging to the natural order *Rosaceæ*. A small tree trunk short, head rounded. Leaves 2-3", elliptic-ovate, acuminate, serrulate glabrous, rarely almost orbicular, young glabrous, or as well as the petiole, pubescent; petiole half the length of the blade. Flowers 1½-2" diam., in sessile umbels or fascicles, rarely with the pedicels collected on a short peduncle; pedicels slender, 2-3". Calyx glabrous or puberulous, without tomentum within; lobes lanceolate, deciduous. Petals very variable in breadth. Styles 3-5, nearly free, very woolly at their united bases. Fruit ½-1" diam., red or scarlet, intruded at the base. Hooker, l. c., 373; Brandis, 205.

Occurs wild 6-11,000 feet. Fruit small, sour, but prized by the hill people. H. Strachey found it at Kunti in Byāns of Kumaon bearing a very small red crab no bigger than a wild cherry and worthless to eat. The flowers appear in spring, and the fruit ripens towards the end of the rains.

Pyrus lanata, Don. , *P. kumaonensis*, Wall. ; *P. Aria*, Herb. ; *P. Aria*, var. *kumaonensis*, Maxim. ; *Sorbus lanata*, Wenzig. — *Galion, mehali, paltu, ban-paltu*.

Belonging to the natural order *Rosaceæ*. A middle sized tree, with the young parts densely woolly; bark of branches smooth, dark brown, shining. Leaves 5-8 by 2-4", acute, glabrous above when old, except from the midrib; lobules of leaf with many serratures; base acute or rounded; nerves 8-12, nearly straight; petiole ½-1". Corymbs short, 2-5". broad, terminal and subterminal, much branched. Flowers shortly pedicelled, ½" diam., white. Calyx turbinate; lobes short, ovate, acute. Petals narrowly obovate, narrowed into naked claw. Stamens 20. Styles 2-3, densely woolly. Fruit very few in a corymb, or solitary, ½-1½" diam., globose and 2-3 seeded, or smaller pyriform and 1-2 seeded. Hooker, Fl. Ind., II., 375; Brandis, 206.

Occurs wild in the Himālaya of these provinces 5-10,000 feet. The fruit is eaten when half rotten and ripens in August-October. Hooker notes that this species differs from *P. Aria* (Ehr.), in the lobulate leaves with regularly serrated lobes, much larger flowers and fewer very large fruits, the latter of

which are very variable in size and shape according to the number of seeds ripened. Other wild species are the following :—

P. kumaoni, Decaisne, very similar in foliage to *P. Pashia*, but at once distinguishable by the more glabrous corymbs and broad rounded calyx lobes. Occurs 5-8,000 feet from Kashmír to Kumaon. Hooker, *l. c.*, 374.

P. vestita, Wall., very closely allied to *P. lanata*, but distinguished by the more elliptic and more woolly leaves with rarely marginal lobules and more numerous nerves; the *mauli* of Kumaon. Madden states that this is the best (sweetest) of the wild fruits. Hooker, *l. c.*, 375.

P. foliolosa, Wall. The *húliya* and *súliya* of Kumaon. Hooker, *l. c.*, 376.

Ribes Grossularia, Linn.; *R. Himalensis*, Royle; *R. alpestris*, Wall. The gooseberry. *Lepcha*, *galdum* (Byáns), *sirgochi* (Juhár).

Belonging to the natural order *Saxifragaceæ* and tribe *Ribesieæ*. Prickles usually 3 beneath each axil; stems smooth or with numerous prickly setæ. Leaves suborbicular, obtusely 3-5 lobed, with the lobes incise-crenate, somewhat villous beneath. Peduncled usually solitary. Calyx-tube long, produced above the fruit. Berry $\frac{1}{2}$ in. long, oblong, inedible in the Indian plant. Hooker, *Fl. Ind.*, II., 410; Brandis, 213.

Occurs in dry places 8-11,500 feet along the Himálaya in these provinces. Flowers in spring; fruit ripens in September-October, has a sour taste and is small. H. Strachey found it at Tála-Kawa in Byáns of Kumaon in September, and pronounces the fruit worthless. The European cultivated variety has been introduced into Kumaon but does not thrive well or give much fruit.

Ribes glaciale, Wall.; *R. acuminatum*, Wall. Red and black currants. *Kukuliya*, *kala-káliya mangle* (Byáns) the red variety;—*durbui*, *dongole* (Byáns) the black variety.

Belonging to the same natural order as the preceding. Polygamo-dioecious. Stem glabrous. Leaves 1-2", cordate, 3-5 lobed, crenate-serrate, middle lobe often elongate; or simple, cordate-ovate, acuminate sometimes, $4\frac{1}{2}$ inches long, glabrous or with scattered hairs above, bracts $\frac{1}{2}$ -" , linear lanceolate usually much exceeding the pedicels. Racemes pubescent, sometimes elongate. Flowers brownish or pink, calyx-segments oblong (but somewhat lanceolate in var. *laciniatum*, H. f. et T.). Berries $\frac{1}{2}$ ", long glabrous or minutely pubescent. Hooker, *Fl. Ind.*, II., 410; Brandis, 214.

R. glaciale is the red variety, and *R. acuminatum* the black variety; the former occurs rarely, but the latter is frequent above 10,000 feet in the Kumaon hills. Both yield a sour fruit of little or no value. Flowers in May; fruit ripens in September-October. H. Strachey found it near Nabhi in Byáns of Kumaon, where it is very abundant and yields a small fruit styled by him 'insipid.'

Ribes nigrum, Linn. Black currant. *Pdpar* (Kumaon).

Belonging to the same natural order as the preceding. Branches and leaves nearly glabrous; racemes long pendulous pubescent, no solitary peduncle at their base; bracts $\frac{1}{16}$ -" long, narrow; pedicels long; flowers green; berry black. Hooker, *Fl. Ind.*, II., 411; Brandis, 215.

Said to occur in the hills towards the head of the Jumna and Tons, and in Kumaon (S), 6,000-10,000 feet; flowers in July; fruit ripens in August-September; somewhat better than the preceding.

Ribes rubrum, Linn ; *R. Himalayense*, Jacq. *Pápar* ; Red currant.

Belonging to the same natural order as the preceding. Branchlets glabrous. Leaves long-petioled, petioles often ciliate at base, ovate-cordate, 3-5 lobed; lobes acute, crenate-serrate; upper surface glabrous or with scattered hairs, lower glabrous or pubescent. Racemes pubescent, elongate, pendulous; bracts $\frac{1}{16}$ - $\frac{1}{8}$ in. long, lower often broad or obovate. Pedicels short. Calyx lobes short, obtuse. Flowers large, greenish-yellow. Berries red, smooth and in a Kashmir variety (?) black. Hooker, Fl. Ind., II., 411; Brandis, 215.

Occurs along the Himálaya 5-12,000 feet in both moist and arid tracts. Brandis notes that in Lahoul there is a variety of this species with a deep campanulate calyx, the lobes of which are ciliate and the fruit (*niangha*) is yellow when unripe, but black with the taste of red currants when ripe. The fruit is altogether better than that of *R. glaciale*, though more acid than is agreeable.

Terminalia belerica, Roxburgh. Beleric myrobalans. *Bahera*.

Belonging to the natural order *Combretaceæ*. Leaves crowded about the extremities of the branches, petioled, oval, entire, firm, smooth; six or seven inches long, and two and a half broad. Petioles round, from two to three inches long, with two opposite glands on the upper side of the apex, and sometimes near the base. Spikes axillary, solitary, simple, erect. Flowers small, of a dirty grey colour. The male flowers towards the apex of the spike, the hermaphrodite ones below. Calyx, stamens, and pistillum as in the genus. Drupe oval, somewhat pentagonal, the size of a nutmeg, fleshy, covered with a grey silky down. Embryo inverse. Hooker, II., 645. Roxburgh, 380; Brandis, 222.

Common in the plains and along the foot of the hills. The flowers appear in February-May, and the fruit ripens in the ensuing cold season. The fruit is exported under the name "Beleric myrobalans" as a tan and dye and to make ink. The kernels are, however, eaten and also yield an oil used in medicine and for burning.

Psidium Guyava, Linn. The guava tree. *Amrúd safari-am*, *piydra*.

Belonging to the natural order *Myrtaceæ* and tribe *Myrted.* A small tree, pubescent on the young branches. Leaves on very short petioles, ovate or oblong, and usually acuminate, 3-4" long, glabrous or nearly so above, softly pubescent beneath and with the principal nerves prominent. Peduncles axillary, $\frac{1}{4}$ " 1-3 flowered; buds ovoid in the adnate part, the free part also ovoid but larger and more or less pointed. Petals broad, $\frac{1}{4}$ " in diameter. Fruit globose or pear-shaped. Hooker, Fl. Ind., II., 468; Brandis, 232; Roxburgh, 396; Drury (U. P.), 367.

Cultivated throughout the plains of these provinces. There are two principal varieties:—

I.—Var. *pyriferum*, Linn.; *Guaiava pyriformis*, Goertn. The white guava. Peduncles 1-fid, fruit pyriform, flowers white, appearing in November-December. Roxburgh, 396. The *amrúd safed* of these provinces.

II.—Var. *pomiferum*, Linn. The red guava. Peduncles usually 2-3 fid, fruit globose or ovoid, flowers white, appearing December-January. Roxburgh, 396.

The *gulābi amrūd* of these provinces.

The first of these is esteemed most. The fruit is eaten raw or cooked or made into preserves or jelly. The root, leaves, and fruit are used in native medicine: see *Drugs*.

Eugenia Jambolana, Lam.; *Syzygium Jambolanum*, D.C.; *Eugenia frondosa*, Wall.; *E. Moorei*, F. Mill; *Calyptanthus Jambolana*, Willd.; *C. capitellata*, Ham.—*Jāman*, *phalandā*, the *phaunda* of kumaon.

Belonging to the natural order *Myrtaceæ* and tribe *Myrtææ*. A tree usually of considerable size with a thick and rather crooked trunk. Leaves ovate, or oblong obtuse or more or less acuminate, coriaceous, closely nerved, 3-6", extremely variable in shape, smooth and shining, the numerous nerves uniting in the margin; petiole $\frac{1}{2}$ -1". Panicles lateral below the leaves rarely axillary or terminal. Cyme short and compact or laxly paniculate. Flowers numerous, sweet-scented: calyx shortly turbinate limb truncate or obscurely 4-lobed, petals calyptrate. Berries olive shaped to globose, purple, from the size of a pea to that of a pigeon's egg. Hooker, Fl. Ind., II., 499; Brandis, 233; Roxburgh, 398; Drury (U. P.) 421.

Cultivated in the plains for its fruit, which ripens in June-July, a full-bearing tree producing a rupee's worth. The fruit resembles a damson with a rough sub-acid and at the same time sweet flavour and is eaten raw or in tarts. The kernels are also eaten in times of scarcity. There are several well-known local varieties. The bark yields a valuable brown dye: see *Dyes*.

E. operculata, Roxb. (Roxburgh, 398; Brandis, 234; Hooker, l. c., 498) ascends the hills to 2,000 feet and is common in the plains of the North-Western Provinces and Oudh. It is the *rai-jāman* of the Kumaon Bhābar, where it is very abundant to the east, and the *jāman* and *dugdugiya* of Oudh, and yields an edible fruit ripening in June-July.

E. Jambos, Linn. Rose-apple. *Gulāb-jāman* (Roxburgh, 401; Brandis, 233; Hooker, l. c., 474) yields a beautifully rose-scented fruit, but I doubt whether it is cultivated in these provinces, though I have seen specimens said to have been procured from Benares.

Punica Granatum, Linn.; *P. Nana*, Linn. The pomegranate, *Anār* (tree and fruit), *dārim*, (fruit); *nāshphāl*, *kushīdā*, *post anār* (rind).

Belonging to the natural order *Lythraceæ* and tribe *Lythreææ*. A large shrub; branchlets round, often armed. Leaves opposite sub-opposite or clustered, oblong or obovate, obtuse, entire. Flowers shortly pedicelled, axillary, solitary or somewhat clustered, large, orange-red. Calyx-tube funnel-shaped, coriaceous, adnate to the ovary below, enlarged above the ovary; lobes 5-7, persistent on the fruit. Petals 5-7, lanceolate, wrinkled, inserted between the calyx-lobes. Stamens very many, inserted round the mouth of the calyx. Ovary inferior with many cells in two whorls; style long, bent, stigma capitate; ovules very many, placentas in some cells axile, in others parietal. Berry inferior, globose, many-celled. Seeds very many, angular, testa coriaceous with a watery outer coat; cotyledons convolute. Hooker, Fl. Ind., II., 580; Brandis, 241; Roxburgh, 402; Drury, (U. P.) 371.

The pomegranate occurs wild all over Kumaon 2-6,000 feet, but is also cultivated in the hills and plains : the flowers appear chiefly in April-May (red or yellow) and the fruit ripens in July-September. There are several varieties cultivated, the flowering pomegranate, the sweet (*mitha*) and sour (*khatta*), but those raised from Afghánistán stocks are preferred. The fruit itself is sub-acid and pleasant and allays thirst, and its juice is boiled with capsicums to make a sauce. The root-bark, leaves, seeds, and rind of the fruit are used in native medicine, see *Drugs* and *Pharm.* 93,477. The flowers dye a light red and the rind a bright yellow. The bark is also used in tanning. The morocco leather of Tangiers, so much used for slippers, is tanned and dyed from the bark of the pomegranate.

Alangium Lamarckii, Thwaites ; *A. decapetalum*, Lam. ; *A. hexapetalum* and *tomentosum* Lamk. et D. C. ; *A. Sandanum*, Kurz ; *A. latifolium*, Miq. *Ahola*, *ghaul*.

Belonging to the natural order *Cornaceæ*. A small tree or rambling shrub, armed or not. Leaves 3-6 by 1-2" ; oblong (*A. decapetalum*), or elliptic (*A. hexapetalum*), acute or sub-obtuse, the base unequal, somewhat rounded, above nearly glabrous with pubescent nerves, beneath with more or less scattered hair and often with tufts of hair or hollow glands in the axils of the primary nerves ; petiole $\frac{1}{2}$ in., hairy, often villous or woolly. Flowers in small close fascicles ; peduncles pedicels and calyx-tube usually woolly. Calyx-limb minutely toothed. Petals 5-10, usually 6-7, $\frac{1}{4}$ - $\frac{1}{2}$ " woolly without. Stamens about 20-30. Style glabrous, uniformly cylindric, stigma large sub-globose. Fruit $\frac{1}{2}$ by $\frac{3}{4}$ " black, closely pubescent or finally glabrous ; endocarp bony. Hooker, *Fl. Ind.*, II., 741 ; Brandis, 250 ; Roxburgh, 404 ; Drury, (*U. P.*), 23.

Is common in the plains and rare along the foot of the hills as far west as the Ganges. Flowers appear in February-April and fruit ripens May-August. The fruit is sweet and sub-acid and contains a mucilage, and though somewhat astringent is eaten. The root and leaves are used in native medicine ; see *Drugs*.

Cornus macrophylla, Wall. ; *C. brachypoda*, C. A. Mey. *Káshi*, *rúchiya* (Kumaon).

Belonging to the natural order *Cornaceæ*. An erect tree 40 feet, branches horizontal. Leaves 6 by 3 $\frac{1}{2}$ " (often much larger), ovate ; base rounded or subacute ; secondary nerves 6 on each side, ultimately glabrous above, beneath with scattered minute appressed hairs ; petiole 1". Panicles terminal, erect, often 4-5" diam., branches opposit or alternate. Calyx-tube urn-shaped, whitish from the numerous appressed hairs. Fruit $\frac{1}{2}$ - $\frac{3}{4}$ " diam. globose. Hooker, *Fl. Ind.*, II., 744 ; Brandis, 252.

Occurs frequently along the Himálaya, 3-8,000 feet. Flowers in May-June. The fruit is eaten and the leaves furnish a fodder for goats. *C. capitata*, Wall., the *Benthamia fragifera* of Lindley and *bamaura* of Kumaon (Hooker, *l. c.*, 744 ; Brandis, 253) is very common along the Himálaya 3-8,000 feet, and yields the well-known fruit *bamaura*, which has a sweetish-bitter taste and is eaten and made into preserves.

Lonicera angustifolia, Wall. *Geung* (Jaunsár), *pítru* (Satlaj).

Belonging to the natural order *Caprifoliaceæ*. A shrub 6-12' ; branchlets glabre cent. Leaves $\frac{1}{2}$ by $\frac{1}{4}$ " (nearly $\frac{1}{2}$ " broad in Sikkim sp.), narrowed at both ends, beneath

pubescent or glabrous ; petiole $\frac{1}{2}$ " Bracts linear or foliaceous. Corolla-tube $\frac{1}{2}$ by 1-10", glabrous or pubescent, subequal ; lobes hardly $\frac{1}{2}$ " white or rose. Style short, glabrous. Fruit usually of two confluent drupes, $\frac{1}{2}$ " diam., globose ; calyx-limb often subsistent. Seeds few. Hooker, Fl. Ind., III., 18 ; Brandis, 255.

Occurs along the Himálaya from the Indus to Sikkim : 6-10,000 feet, in Kumaon. Flowers appear just before the rains : the berry is of a reddish colour, about the size of a pea and is edible. *L. quinquelocularis*, Hard., the Himálayan honeysuckle, the *bhat-kúkri* of Kumaon and *cheraya* of Garhwál, affords fodder for cattle.

Viburnum stellulatum, Wall. ; *V. Mullaha*, Ham. *Lál tit-maliya* (Kumaon).

Belonging to the natural order *Caprifoliaceæ*. A large shrub ; branches puberulous. Leaves 3 by $1\frac{1}{2}$ ", base obtuse or cuneate, parallel-veined ; petiole $\frac{1}{2}$ " Corymbs terminal, in fruit divaricate, 3-5" diam., subglobose ; bracts $\frac{1}{2}$ " linear, membranous, caducous. Calyx-tube stellately hairy ; lobes minute, ovate. Corolla-lobes 1-16", round, pubescent in bud. Style short, stigma capitate. Drupe $\frac{1}{2}$ by $\frac{1}{2}$ ", compressed, broadly oblong, yellow-red ; seed 2-grooved on both faces, hardly concave ventrally. Hooker, Fl. Ind., III., 4 ; Brandis, 258.

Occurs commonly in Kumaon 6-10,000 feet. The flowers appear in July-August, and the somewhat sour fruit is eaten and valued for its sub-acid flavour. *V. coriaceum*, Blume, the *kála tit-maliya* of Kumaon, also occurs, but the fruit is not eaten.

Anthocephalus Cadamba, Miq. ; *A. morindifolia*, Korth. ; *Nauclea Cadamba*, Roxb. ; *Sarcocephalus Cadamba*, Karz. *Kadam*, *karam*.

Belonging to the natural order *Rubiaceæ*. A large tree ; branches spreading. Leaves coriaceous, 5-9", shining above, pubescent beneath. Heads 1-2" diam., peduncles stout. Flowers orange-coloured with white stigmas, scented at night. Fruit as large as a small orange. Wallich's 6088C, a cultivated plant from Ava, is very different, having membranous leaves and very oblique nerves. Hooker, Fl. Ind., III., 23 ; Roxburgh, 172 ; Brandis, 261.

Commonly cultivated in the plains for its flowers and fruit and in suitable places in the hills. Flowers appear in May-July and are used in worship by Hindus : the fruit is eaten in seasons of scarcity.

Randia uliginosa, Lam. ; *Gardenia uliginosa*, Retz ; *Posoqueria uliginosa*, Roxb. *Ban-pindálu* (Bijnor), *piadaru* (Kumaon), *panár* (Oudh), *paniya* (Gorakhpur).

Belonging to the natural order *Rubiaceæ* and tribe *Gardeniæ*. A small usually very smooth tree, with thick woody 4-angled branches, and leaves (except on young shoots) at the ends of the branchlets. Leaves 2-8 by 1-4" pale when dry, narrowed into the short slender petiole ; stipules triangular. Flowers dimorphic, either large and sessile, or small and peduncled. Calyx-tube $1\frac{1}{2}$ ", lobes rounded. Corolla of the large from 1 to nearly 2" diam. ; lobes rounded ; tube with a ring of hairs within ; of the small form with a very short tube glabrous within. Stigma fusiform, 2-lobed in the sessile-flowered, entire in the peduncled. Berry 2" long, yellow, ellipsoid in the sessile-flowered, smaller in the peduncled-flowered. Seeds compressed, smooth. Hooker, Fl. Ind., III., 110 ; Roxburgh, 239 ; Brandis, 273.

Common in the sub-montane tract and in Kumaon up to 2,500 feet, where the fruit is collected and sold for food, either cooked or roasted, and the leaves are eaten cooked as greens. The leaves also afford a fodder for cattle.

Randia dumetorum, Lam. ; *R. nutans*, *longispina* and *floribunda*, D. C. ; *R. Rottleri*, W. et A. ; *R. stipulosa* Miq. ; *R. spinosa*, Blume ; *R. malabarica*, Wall. ; *Gardenia nutans*, *longispina* and *floribunda*, Roxb. ; *G. dumetorum*, Retz. ; *G. stipularis*, Rott. et Willd. ; *G. glabra* and *propinqua*, Br. ; *G. latifolia*, Schlecht. ; *Posoqueria dumetorum*, *nutans*, *longispina* and *floribunda*, Roxb. ; *Ceriscus malabaricus* Goertn.—*Mainphal*, *māngūl karhar*, (N.-W. P.) ; *main*, *maini* (Oudh).

Belonging to the natural order *Rubiaceæ*. A small tree or rigid shrub ; spines horizontal, often long and strong. Leaves 1-2", glabrous or harshly or softly pubescent on one or both surfaces, obtuse or subacute, narrowed into the short petiole ; stipules ovate, acuminate. Flowers rarely 2-3 on a peduncle, subsessile, greenish yellow or white. Calyx strigose ; teeth very variable, sometimes spatulate. Corolla $\frac{1}{2}$ - $\frac{3}{4}$ " diam., lobes oval or oblong. Berry globose or ovoid $\frac{3}{4}$ -1" long, glabrous or pubescent, smooth or obscurely ribbed, yellow, pericarp thick. Seeds compressed, imbedded in pulp. Hooker, Fl. Ind., III., 110 ; Roxburgh, 240 ; Brandis, 273.

• Common in the plains, the *sāl* forests of the Bhábar, and in the lower hills up to 4,000 feet. Flowers in the spring ; fruit ripens during the cold season. The fruit when ripe is of a yellow colour, 1"-1 $\frac{1}{2}$ " long with a thick firm fleshy pericarp ; kernel cartilaginous, 2-celled, the seeds embedded in a quantity of gelatinous pulp, attached to the middle of the partition ; edible when roasted (Brandis).

Mæsa argentea. Wall. *Phasera*, *gogsa*.

A large shrub belonging to the natural order *Myrsinaceæ*. 6-8' high ; branches subsucculent, clothed with soft and dense pubescence. Leaves elliptic, 6-10" long, dentate with sharp teeth, slightly pubescent above, white or grey, tomentose beneath, acuminate, on petiole 1' long. Flowers white, on short pedicels, in short compact axillary racemes as long as petiole, with a few short branches at the base. Berry round, smooth, white, size of a peppercorn. Seeds numerous, minute, immersed in the surface of the fleshy globular placenta. Brandis, 283.

Occurs along the outer ranges of the Himálaya 4-6,000 feet. Flowers in April-May ; the fruit ripens in July and is eaten.

Bassia latifolia, Roxb. *Mahwa*, *mahúa*.

Belonging to the natural order *Sapotaceæ*. A large tree ; trunk straight but short, covered with smooth, ash-coloured bark. Branches very numerous, the lower ones spreading horizontally. Leaves alternate, petioled, crowded about the extremities of the branches, oblong, rigid, smooth above, somewhat whitish below, 4"-8" long, and 2-4" broad. Petioles round, about an inch long. Stipules subulate, downy. Flowers numerous, crowded from the extremities of the branchlets, peduncled, at all times bowing, *viz.*, bent with the mouth of the flower directly to the ground. Peduncles about an inch long, round, thickened, covered with rust-coloured down. Border 7-14 parted. Germ ovate, hairy, from six to eight-celled, with one seed in each, attached to the upper end of the large axis. Berry, the size of a small apple. Seeds 1-4, very rarely more. Embryo erect, and without perisperm. Roxburgh, 411 ; Brandis, 289.

Cultivated throughout the plains and in the sub-montane tract (sparsely) : especially abundant in Bundelkhand. Flowers usually appear before the new leaves in March-April : fruit ripens June-July. One of the most valuable trees in India, considered as a food resource. The flowers are dried and eaten either

raw or cooked or with grain or in sweetmeats. They also yield a strong spirit. The seeds, too, give an oil which is used as a substitute for or to adulterate clarified butter, but does not keep well in the hot weather.

Bassia butyracea, Roxb. *Chiúra*, *chyára*; the butter is called *chiúra ka-ptua* in Almora and *phalel*, *phalwára* in the plains.

Belonging to the natural order *Sapotaceæ*. A large tree; branchlets, petioles, pedicels and under side of leaves with soft floccose tomentum. Leaves coriaceous, clustered near ends of branches, obovate or obovate-oblong, 6-12 in. long, on petioles 1 in. long; main lateral nerves 15-20 pair. Stipules minute, caducous. Flowers numerous, near the ends of branches, below a tuft of leaves or in the axils of the lower leaves, drooping, on pedicels 1-1½ in. long. Calyx coriaceous, densely clothed with rusty tomentum; sepals 5, ovate. Corolla pale yellow, tube cylindric, not fleshy, as long as calyx, limb of 8 spreading, oblong obtuse divisions, as long as tube. Stamens 30-40, glabrous, inserted in the mouth of the tube, filaments as long as anthers. Berry ovoid, smooth, fleshy, 1-3 seeded. Brandis, 290; Roxburgh, 411. As Res. VIII, 477. •

Occurs along the outer-ranges 1,500-4,000 feet. The flowers appear from November to January, and the bees that feed on them produce the best honey. Madden records its occurrence on the Kamola ghát leading to the Kota Dún, and again in the shady glens near Púnagiri above Barmdeo. In the Pithoragarh valley it occurs in great abundance, reaching the size of a large tree as high up as Kánthagaon (4,000 feet). The sweet insipid pulp of the fruit is eaten, and the cake left after the oil has been extracted is eatable.

From the seeds a soft solid vegetable butter is extracted, of the consistence of fine lard, and which melts entirely at 120° F. It keeps well in the plains and is used as a lip salve and cold cream and in rheumatic affections; see *Drugs*.

Mimusops indica, A. D. C.; *M. hexandra*, Roxb. *kauki*, Wall. (not Linn). *Khirni*.

Belonging to the natural order *Sapotaceæ*. A large evergreen tree. Leaves coriaceous, shining, wholly glabrous, sometimes approximate near ends of branches, blade 2-4 in. long, obovate-oblong obtuse or emarginate, petiole ½-1 in. long. Flowers whitish, ½ in. across, in axillary fascicles of 3-6 flowers, peduncles shorter than petioles. Calyx-segments 6, ovate, acute, shortly tomentose outside, edges hairy. Corolla of two circles, the inner consisting of 6-8 oblanccolate segments, narrowed into a short claw, and alternating with 6-8 pairs of linear, subcoriaceous acute segments of the same length, forming the outer circle. Stamens 6-8, exceeding half the length of corolla-segments, opposite to the lobes of the inner circle, alternating with an equal number of flat, bifid, more or less denticulate staminodes, which are as long as or a little shorter than the filaments. Fruit a yellow berry, generally 1-seeded, size and shape of an olive. Brandis, 291; Drury, F. P. 2, 151; Roxburgh, 318.

Cultivated in the plains: indigenous in Bánda. The flowers appear in the cold weather; the fruit is eaten.

Mimusops Elengi, Linn. *Maulsári*.

Belonging to the natural order *Sapotaceæ*. A large evergreen tree, glabrous; only youngest leaves, pedicels and outside of calyx with short rusty pubescence. Leaves coriaceous, shining, wholly glabrous when full-grown, blade about 4 in. long, elliptic, short-acuminate, on

petiole $\frac{1}{2}$ in. long. Flowers pure white, fragrant, nearly 1 in. across, in axillary fascicles of 2-6 flowers, drooping, on peduncles shorter than, or as long as petiole. Calyx-segments 8, ovate-lanceolate, acuminate. Corolla of 2 circles of lobes, the inner consisting of 8-10 obovate oblong segments, narrowed at base, alternating with twice their number of linear-oblong lobes of the outer circle, all lobes more or less dentate near the apex. Stamens 8, opposite to the lobes of the inner circle, anthers, long-acuminate, alternating with an equal number of lanceolate staminodes, which are shorter than stamens, and densely hirsute on the back with long stiff hairs. Fruit a smooth, ovoid, 1-seeded berry, yellow when ripe, about 1 in. long. Brandis, 293; Drury, F. P., II., 151; Roxburgh, 318.

Cultivated in the plains for its flowers and fruit. The former are used in worship and to form garlands on festive occasions; the latter is eaten. From the seeds an oil is obtained and used for culinary purposes and burning. The flowers appear in March-April.

- **Diospyros Melanoxylon**, Roxb.; *D. tomentosa*, Roxb.; *D. Tupru*, Buch.; *D. exsculpta*, Ham. *Tendu, kendu, temru*.

Belonging to the natural order *Ebenaceæ*. A middle-sized tree, branchlets, young leaves, inflorescence with a soft grey or tawny tomentum. Leaves mostly subopposite, coriaceous, 3-6 in. long, but sometimes much longer, to 12 in. long, when full-grown glabrous above, tomentose or pubescent beneath; main lateral nerves 6-8 pair, often irregular and branching. Petioles $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Male flowers tetramerous, sessile or nearly sessile, in short pedunculate 3-12 flowered, often drooping axillary or extra-axillary cymes, bracts subulate, as well as calyx and corolla densely tomentose. Stamens included, 12-16, free, inserted in 1 circle on the torus. Female flowers solitary, axillary or extra-axillary, generally 2, opposite to each other, larger than male flowers, subsessile, or on short thick peduncles. Calyx-lobes 4 or 5. Corolla somewhat less than twice the length of calyx, divided at the top into 4-5 short, cordate, acute or shortly acuminate lobes. Staminodes 8-10 or fewer, sometimes connate in pairs, at the base or higher up. Styles 2 or 3, bifid, ovary densely hairy, 4-8 celled, 1 ovule in each cell. Fruit yellow when ripe, ovoid or globose, $1\frac{1}{2}$ in. across, supported by the flat spreading calyx-lobes, with undulating, often reflexed edges. Pulp yellow, soft, sweet, slightly astringent. Seeds 4-8, compressed, oblong, the back curved, shining, brown, often marked with bands across. Albumen ruminated. Brandis, 294; Roxburgh, 412.

Common in the dry forests along the foot of the Himálaya and in Bándá and Mirzapur. The fruit ripens in March-April and is eatable. It has a sweetish-astringent taste and is considered to afford a fair material for sherbets.

- Salvadora oleoides**, Decaisne; *S. persica*, T. And. *Jhál, pílu* (fruit).

Belonging to the natural order *Salvadoraceæ*. A shrub or small tree, with stiff branches, ash-coloured or reddish grey branchlets, and dull cinereous persistent foliage. Leaves glaucous, linear-lanceolate or ovate-lanceolate, blade $1\frac{1}{2}$ -2 $\frac{1}{4}$ in. long, membranous when young, coriaceous and somewhat fleshy when full-grown; main lateral nerves often indistinct. Flowers greenish-white, sessile, in erect compact axillary paniculate spikes, often clustered and shorter than leaves. Calyx-cupshaped, divided half way or nearly half-way into 4 rounded, obtuse lobes. Corolla as long as or a little longer than calyx. Fruit globose, $2\frac{1}{2}$ lines diam., yellow when ripe, dark brown or red when dry, supported by the persistent calyx and marcescent corolla. Brandis, 316.

Planted in the upper and middle Duáb for its fruit. The flowers appear in March-April; the fruit ripens about June and is sold fresh and dried. It is

sweet to the taste and somewhat resembles currants in flavour. In the central and southern Panjáb where it flourishes best and is common, it is esteemed an important adjunct to the food resources.

Carissa Carandas, Linn ; *C. congesta*, Wight.—*Karanda*, *timukhiya*;

● Belonging to the natural order *Apocynæ*. A large evergreen shrub with a short stem, glabrous, only inflorescence pubescent. Branchlets generally alternate, with twin stout, sharp, often forked, glabrous, shining spines at their base $1\frac{1}{2}$ " long; branches exceptionally opposite, generally without spines. Leaves coriaceous, generally penninerved, wholly glabrous, and shining on both sides, elliptic ovate or obovate, rarely elliptic oblong, obtuse or mucronate, $1\frac{1}{2}$ -3", long., 1-2" broad, subsessile or on short petioles. Flowers white, inodorous, on short pedicels in sessile or pedunculate pubescent cymose corymbs of 10-20 flowers at the ends of branches. Bracts linear, pubescent. Calyx pubescent, cleft half-way or deeper into lanceolate ciliate segments. Corolla-lobes lanceolate, shorter than tube, but more than half its length. Ovules 4 in each cell of ovary. Berry ovoid or globose, $\frac{1}{2}$ -1" long, 4 or more seeded, shining, first red, black when ripe. Brandis, 320 ; Roxburgh, 231.

Cultivated throughout the plains for its fruit. The flowers appear January-April and the fruit ripens in the early rains July-August. There are several varieties esteemed for jams, jellies, and pickles, and others are eaten raw. The wild variety *C. diffusa* affords an edible fruit.

Orthanthera viminea, Wight ; *Apocynum vimineum*, Wall.—*Chaphiya* (Kumaon), *máhur* (Oudh).

● Belonging to the natural order *Asclepiadæ*. A glabrous leafless shrub with minute subulate scales in the place of the leaves. Flowers few, $\frac{1}{2}$ in. long, green, short pedicelled in short pedunculate axillary umbelliform cymes of 3-6 flowers. Peduncles, pedicels, calyx and corolla villous with long soft hairs. Calyx parted nearly to the base into 5 linear-lanceolate segments, as long as the corolla-tube. Corolla campanulate, tube cylindric, longer than the oblong, erect segments which are valvate in the bud. No corone, but the staminal tube girt at the base by an undulate ring. Pollen-masses 10, stipitate erect. Follicles compressed, linear, glabrous, erect 4-5 in. long. Brandis, 334 ; Drury, F. P., II., 236.

Common in the Duáb and along the base of the Himálaya up to 2,000 feet and in the Oudh forests. The flower-buds are eaten as a vegetable and the fibre is made into cordage.

Cordia Myxa, Linn; *C. obliqua*, Willd.; *C. latifolia*, *Myxa* and *polygama*, Roxb.—*Bairala*, *baurala* (Kumaon); *lasora bokar* (plains).

● Belonging to the natural order *Boraginæ*. A middle-sized tree; young leaves soft-pubescent beneath, more or less rough when full-grown, broad-ovate or rotundate, base rounded or short-cuneate, blade 3-6" long, petiole 1-2" main lateral nerves 4-6 pair, 1 or 2 pair from the base of the leaf. Flowers white, polygamous, pentandrous, on short pedicels, in loose terminal and lateral pedunculate cymes, without bracts. Calyx without prominent ribs, entire and closed over the corolla in the bud, splitting irregularly, when the flower expands into 5 short lobes, nearly glabrous outside, lobes hairy inside. Corolla-tube nearly as long as calyx, with 5 narrow, recurved lobes, as long as the tube. Stamens exserted, filaments hairy. Drupe supported by the enlarged and hardened calyx, its limb irregularly and broadly toothed, ovoid or nearly globose, $\frac{1}{2}$ -1 $\frac{1}{4}$ " long, puberulous when young; when ripe, minutely rugose, but shining, yellowish brown, pink or nearly black. Kernel very hard, rugose, 1 or 2-celled, in a rough viscid sweetish almost transparent pulp. Brandis, 336 ; Roxburgh, 198.

Cultivated throughout the plains; wild along the Himálaya up to 5,000 feet. The flowers appear in March-April, and the fruit ripens May-July. The unripe fruit is pickled and the ripe fruit is eaten raw or stewed. The leaves are used as plates, the bark affords a cordage fibre, the viscid pulp of the fruit is used as bird-lime and its juice as a dye. The kernel of the fruit is also eaten, and the wood is of value for agricultural purposes and boat-building.

Cordia vestita, H. f. et. T. ; *C. incana*, Royle ; *Gynaion vestitum*, D. C. *Kumbhi*, *pin*, *kúm*, *indak*.

Belonging to the natural order *Boraginæa*. A small or middle-sized tree; branchlets, under side of leaves and inflorescence clothed with soft grey pubescence; leaf buds and base of petioles enveloped in dense tufts of long tawny or rust-coloured hairs. Leaves alternate, broad-elliptic, or rotundate, upper side very rough, blade 3-4 in. long, 2-3 in. broad, petiole 1-1½ in. long; main lateral nerves 3-5 pair, the lowest pair proceeding from the base. Flowers yellowish-white, polygamous, in compound cymes, often several together on short peduncles at the end of branches; cymes of male flowers often composed of unilateral racemes. Calyx at the time of flowering clavate, ½-¾ in. long, ribbed and furrowed, splitting into a number of unequal teeth. Corolla-tube as long as calyx, lobes obovate-oblong, as long as tube, undulate, spreading. Stamens exserted, filaments hairy at the base. A rudimentary ovary without style or stigma in the male flowers. Drupe ¾ in. long, cuspidate with the persistent base of style, and girt at base with the enlarged, hardened, flat cup-shaped calyx, ¾-1 in. across, with a ribbed, cunate and denticulate edge. Brandis, 338.

This species occurs throughout the submontane tract and along the outer ranges up to 4,000 feet. The fruit is full of a gelatinous pulp which is commonly eaten and considered refreshing. The flowers appear in the spring and the fruit ripens in the rains.

Ehretia serrata, Roxb. *Pána*, *pánjlaudi*, *panden*, *koda*, the *kurkúriya* and *arjún* of Oudh.

Belonging to the natural order *Boraginæa*. A middle-sized tree: leaves oblong-lanceolate, acuminate, serrated: panicles terminal and axillary, compound: flowers fascicled, sessile: calycine lobes obtuse: corolla subeolate: stamens exserted: flowers small, greenish-white, fragrant. Drury, F. P., II., 329; Roxburgh, 200; Brandis, 339.

Common along the Himálaya up to 4,000 feet: planted in the upper districts. Flowers appear February-April; fruit ripens in November-January. The unripe fruit is pickled and the sweetish ripe fruit is eaten raw or cooked in tarts.

Ehretia laevis, Roxb. ; *E. punctata*, Roth. ; *Beurrieria laevis*, Don. *Chamror*, *koda*, *dardr*, the *datranga* of Oudh and *tamboli* of Bānda.

Belonging to the natural order *Boraginæa*. Arboreous. Trunk erect; bark ash-coloured; branches numerous, nearly erect. Leaves alternate, short-petioled, oval, sometimes scalloped, pretty smooth, 3"-4" long, 2"-3" broad. Corymbs lateral or axillary, 2-forked, composed of thin, recurved, 1-ranked spikes. Flowers white small. Roxburgh, 201; Drury, F. P., II., 330; Brandis, 340.

Not uncommon in the upper districts, Oudh forests, and sub-Himálayan tract to 2,500 feet. Flowers appear in January-February and the fruit ripens in

April-June. The fruit is insipid but is eaten and the leaves afford a fodder for cattle.

Hippophaë salicifolia, Don. *Dhūr-chuk*, *tarwa-chuk*, *chuma* (the name *tarwa-chuk* is given by H. Strachey to *H. salicifolia*, Don, found by him near Mángdang in Byáns of Kumaon. He pronounces the berries to have a palatable acid flavour when quite ripe, otherwise disagreeably sour). T. Thomson notices the same species at 6,000 feet (Travels, p. 59 = *H. conferta*, Wall.) above Rámpur on the Satlaj. It is doubtful to which of the species the vernacular names apply.

A large shrub, with scattered lateral thorns, the ends of main branches often thorny. Leaves membranous, 2-3 in long, linear-lanceolate, narrowed into a short petiole, edges revolute, green and glabrate above (pubescent while young), white velvety beneath, with dense soft tomentum of short stellate hairs; branchlets, petiole and midrib clothed beneath with circular, irregularly indented rust-coloured scales, a few ferruginous scales occasionally on the under side of leaves. Fruit fleshy; seed dark brown, shining, compressed, ovate or obovate, $\frac{1}{4}$ in. long, with a deep longitudinal furrow on one and a shallow furrow on the other face. Brandis, 387.

Occurs chiefly in moist gravelly stream beds in the interior of the Himálaya, 7-12,000 feet and as far up as 15,000 feet in the upper bed of the Dárma-yáukti, a tributary of the Káli in Kumaon. The flowers and fruit appear from May to November. The fruit is eaten but is disagreeably sour, though making up well in a tart with sugar, or into a *chatni*.

Elæagnus latifolia, Linn.; *E. conferta*, Roxb., *E. ferruginea*, A. Rich. *Ghiwáí*, *mijhdaula* (Kumaon).

Belonging to the natural order *Elæagnæ*. Evergreen with divergent axillary spines; branchlets, petioles and under side of leaves densely clothed with silvery or ferruginous, circular, lobed and dentate scales. Leaves ovate-oblong, acuminate, blade 5-6 in., petiole $\frac{1}{4}$ in. long, upper surface glabrous, shining. Flowers few or numerous, pale yellow, scented, pedicellate, in axillary, often shortly pedunculate, clusters. Perianth clothed outside with silvery scales, the upper free part (in the bisexual flowers) campanulate, not more than twice the length of segments. Fruit ovoid-oblong, 1-1 $\frac{1}{4}$ in. long, red or yellow when ripe, succulent, putamen coriaceous, with eight prominent ribs, clothed inside with a thick felt-like coating of white silky hairs. Brandis, 390; Roxburgh, 148.

Occurs along the lower Himálaya to 6,000 feet. The flowers appear in the cold-weather and the fruit ripens in May-June. The fruit has a pleasant, sub-acid, somewhat astringent taste and is eaten either raw or in a confection with sugar. The flowers and fruit are officinal. *E. parvifolia* is perhaps more common and yields an edible fruit.

Morus indica, Linn.; *M. parvifolia*, Royle. Mulberry. *Tút*, *tútri*.

Belonging to the natural order *Urticacæ*. A deciduous shrub or small tree; buds, stipules, and youngest leaves with long hairs. Leaves pubescent when young, rough afterwards with minute round raised dots, ovate, long-acuminate, sharp-serrate, often deeply lobed, with three basal nerves, midrib penniveined, blade 2-5 in., petiole $\frac{1}{4}$ -1 $\frac{1}{4}$ in. long. Male fl. short-pedicellate, perianth-segments elliptic, hairy as well as pedicel and peduncle. Female fl.: spikes short-ovoid on slender peduncles about half the length of spike; leaves of perianth obovate, with broad white edges; styles long, hairy, connate to about one-fourth their length. Fruit small, ovoid or subglobose, black when ripe. Brandis, 408; Roxburgh, 658.

Wild in the lower Himálaya ; cultivated in the plains for its leaves which are used to feed silkworms in Bengal, Burmah, and southern India. Flowers in February ; fruit appears in May, but is worthless as an article of food except in times of scarcity. *M. serrata*, Roxb. (658), the *ktmu* or *htmu* of Kumaon, commonly occurs wild along the outer Himálaya. 2,500-9,000 feet. It has a long purplish fruit which ripens June-August. Its leaves are coarse for silkworms, but perhaps its cultivation for this purpose at a lower level might improve its quality.

Morus laevigata, Wall. ; *M. glabrata*, Wall. *Tát*, the *sháh-tát* and *siydh-tát* of Kumaon.

A middle-sized or large deciduous tree ; stipules and bud-scales with long soft hairs, extremities and youngest leaves slightly pubescent. Leaves glabrous, smooth or slightly rough, ovate, short-acuminate, sometimes lobed, base often cordate, blade 3-7 in., petiole about 1 in. long, basal nerves 3, midrib penniveined with 4-6 pairs of main lateral nerves. Flowers in short, drooping, short-pedunculate spikes, peduncles hairy. Male fl. sessile, perianth-segments concave, very hairy outside, filaments slightly dilated at base. Female fl. perianth of four glabrous, rotundate, concave segments ; styles slightly connate at base, papillose, otherwise nearly glabrous. Brandis, 409.

Occurs wild and cultivated, though not common, in the lower Himálaya and cultivated in parts of the plains. Flowers appear in the cold-weather and the long cylindrical, yellowish-white or pale purple fruit appears in March-May and is eaten. It is, however, insipidly sweet and of little value. *M. multicaulis*, Loud., appears to be a variety of *M. alba* and is the species that by experience is shown to be the best for silkworms in these provinces. It thrives well in the Dún and at Saháranpur where there are very large plantations. *M. chinensis* was introduced by Dr. Jameson from China and is equally good as a feed for silkworms but has a much smaller leaf, is not so hardy, and requires very much greater care, all elements requiring consideration where large interests are at stake. The leaves of the former in poor dry soils are 6" by 8" in breadth and in rich, humid soils 15"-16" by 12" in breadth. Both are easily raised by cuttings or from seed and by grafting. The local wild species are not good for propagation.

Ficus Carica. Linn. ; Fig. *Anjir*.

Belonging to the natural order *Urticaceæ*. A middle-sized deciduous tree, with glabrous, smooth, grey or brown branches, the branchlets of the current year pubescent. Leaves cordate, 3-5 nerved, dentate, and more or less deeply lobed, lobes obtuse, blade 4-8, petiole 2-3 in. long, upper side rough, under side tomentose ; stipules early deciduous. Receptacles pedunculate, axillary, turbinate, narrowed into a stalk, and supported at the base by a few membranous, early deciduous bracts. The receptacles which appear first, in the lower axils, are androgynous, containing a few male, with numerous female flowers, those which appear later in the year, in the upper axils, only produce female flowers. Male fl. near the mouth of the fig, perianth-segments 3-5, stamens 1-5, generally 3, filaments longer than perianth. Female fl. : perianth-segments 3-5, ovary sometimes 2-celled, style lateral, filiform, bifid at the top. Fruit, when ripe, yellow or dark purple, greatly varying in size and colour. Brandis, 418 ; Roxburgh, 636.

Cultivated throughout the plains and along the lower hills. The fruit ripens from May to August, and in these provinces the imported species does best and has most flavour.

Ficus virgata, Roxb. ; *F. caricoides*, Roxb. The *beru* of Kumaon.

Belonging to the natural order *Urticaceæ*. Trunk tolerably erect. Branches few, weak, ascending, covered with smooth, brownish, ash-coloured bark ; the whole height of plants six years old, from four to eight feet. Leaves alternate, petioled, broad-ovate, three-nerved, obtuse, serrate-crenate, very downy underneath ; from three to four inches long, by three broad. Petioles round, downy, about two inches long. Stipules semi-lanceolate, caducous. Fruit axillary, solitary, ovate, of the size of a pea, yellow, pretty smooth, supported on round, downy peduncles, rather less than an inch long. Calyx common, three-leaved, and removed a little from the fruit, by a short pedicel. Male—corol round the inside of the mouth of the fruit, long-pedicelled. Calyx of from three to five, lanceolate, hairy leaflets. Stamina three. Female corolllets numerous, sub-sessile. Calyx generally three-leaved. Germ round. Style hairy, tapering to a fine, hairy, coloured stigma. Roxburgh, 636 ; Brandis, 419.

Common along the outer Himálaya, wild and also cultivated. Fruit ripens in June-October and is largely eaten and even exported to the plains.

Ficus Cunia, Buch. *Kunia* (Kumaon), *kuinaw* (Garhwál), *kúshar* (Oudh), *hasa* (Gorakhpur).

Belonging to the natural order *Urticaceæ*. Leaves short-petioled, bifarious, oblong, lanceolate, acute at the base, the lower half protruding so as to form a large sub-rotund lobe, which is longer than the petiole, margins a little waved, and serrated, scabrous on both sides, from six to twelve inches long, and from two to four broad. Fruit pedicelled, somewhat turbinate, a little ribbed, of the size of a large filbert, hairy, they are generally produced in pairs, or in threes, on long, procumbent, radical, and cauline, compound, leafless branches, in compound racemes often some feet long. Calyx of the fruit three-cleft, presses in to the calyx. Roxburgh, 647 ; Brandis, 421.

Occurs along the outer Himálaya up to 4,000 feet. The fruit ripens in August-October and is eaten in the hills and is also used in medicine.

Ficus glomerata, Roxb. ; *Covellia glomerata*, Miq. *Gúlar*, *panwa*, *lelka*.

Belonging to the natural order *Urticaceæ*. Trunk seldom straight, but thick and high. Branches thin, and more erect, than in any of the former trees. Bark of a rusty greenish colour, and scabrous. Leaves alternate, petioled, oblong, or broad lanceolate, tapering equally towards each end, entire, most slightly three-nerved, smooth on both sides ; the under side is paler and covered with most minute green dots, from four to six inches long, and from two to two and a half broad. Petioles channelled, from one to two inches long. Stipules as in the other species. Racemes compound, or panicled, issuing immediately from the trunk or large branches, ramifications spreading and jointed. Bracts several surrounding the joints, two-fruited, at least there are always the germs of two, but rarely both come to maturity. Fruit pedicelled, nearly as large as common figs, clothed with much soft down, when ripe of a rich orange colour, umbilicus closed with innumerable scales. Calyx of the fruit small, three-leaved. Roxburgh, 646 ; Brandis, 422.

Cultivated and wild throughout the plains and along the submontane tract, though not common in the latter. Fruit ripens from April to July and affords a valuable food resource seasons of scarcity.

Ficus Roxburghii, Wall.; *F. macrophylla*, Roxb.; *F. sclerocarpa*, Griff.; *Covellia macrophylla*, Mtq.—*Timla*, *timila*.

Belonging to the same order as the preceding. A middle-sized tree, with hollow branchlets; under side of leaves hoary or with soft grey pubescence. Leaves broad-ovate, with deeply cordate base, acute, irregularly dentate, 3 basal, and 4-6 main lateral nerves on either side of midrib, joined by prominent transverse veins at right angles to basal and lateral nerves; blade 6-18 in. long, petiole 1-4 in. Fruit tubercled, hairy, yellowish green, tinged with red when ripe, turbinate, 1-2 in. long, 2-3 in. broad, marked with 8-12 longitudinal ridges, mouth closed with numerous cordate scales, pedunculate, in clusters of 6-20, on short thick leafless branchlets, on the trunk and at the base of main branches. Brandis, 422.

This tree occurs all along the outer Himálaya up to 5,000 feet and affords one of the best species of the wild figs. The fruit ripens in March-May and is collected and exported to the plains.

Artocarpus integrifolia, Linn. Jack-tree. *Kathal*.

Belongs to the natural order *Urticaceæ*. Leaves alternate petioled, oval, in young luxuriant plants often lobed, of a firm leathery texture, above of a deep smooth shining green, below less so, about four inches long. Petioles short, slightly channelled. Stipules two broad-lanceolate, pretty smooth, embracing like a spathe the next inner leaf and ament when present, falling as soon as they begin to expand. Male flowers—ament single, short-peduncled, the size of a man's thumb, or more; generally on small, recent branchlets which issue from the trunk and larger branches, everywhere most closely covered with the small sessile corollets. Spathe no other than the abovementioned stipules. Perianth proper, or corol two-leaved; leaflets wedge formed, equal, a little hairy. Stamens, filament single, thick, club-shaped, rather larger than the perianth. Anthers two-lobed; lobes oval, and grooved in the middle. Female flowers on the same tree, and mixed with the male on the same branchlets. Calyx; spathe no other than the male has, viz., the stipules. Ament oblong, covered with innumerable, small, sessile germs, perforated at the apex for the style to pass. Germs numerous, their exterior coverings uniting near the base; above they are from four to six-angled, and throughout solid, except where the germ proper and style is lodged. Germ proper, ovate, lodged in the bottom of the last described covering. Style single, rather longer than the envelope of the germ. Stigma single, recurved, clubbed, grooved on the outside. Fruit compound, oblong, murexed, from twelve to thirty inches long, from six to twelve in diameter, weighing from ten to sixty pounds. Seeds reniform, one in each germ, were all to come to maturity, which never can happen; they are about the size of a nutmeg, enveloped in a thin, smooth, leathery sheath, lodged within the fleshy eatable part of the fruit, which formed the exterior coverings of the germ, already noticed. Roxburgh, 634; Brandis, 425.

Cultivated throughout the plains for its fruit, which ripens in May-July and often attains a very great size. The seeds are also roasted and eaten and somewhat resemble chestnuts in flavour.

Artocarpus Lakoocha, Roxb. *Barhal*, the *dahu* or *dhao* of Kumaon.

Belonging to the same natural order as the preceding. Bark of the trunk very rough; that of the young parts pretty smooth. Leaves about the extremities of the branchlets alternate, short-petioled, somewhat bifarious, oval, entire, generally pointed, smooth above, downy beneath, with many parallel veins, and beautifully reticulated between them, from four to twelve inches long, and from two to six broad. Stipules small, cordate, caducous. Aments axillary being from the axils, or most exterior germs, of last year's leaves; the male are below, the female

on the same branchlets, but from different axils. Male flowers—calyx ; spathe no other than one, or two, small, stipule-like scales, embracing the insertion of the spadix. Aments sub-sessile, irregularly roundish, about the size of a nutmeg, everywhere covered with innumerable florets, internally of a beautiful rose colour. Perianth proper, or corol, consisting of small, wedge-shaped, truncated scales. I find it difficult to assign any determined number to each stamen, from two to four is most common. Filaments rather longer than the scales of the calyx, tapering from the base. Anthers round, minute, elevated a very little above the surface of the spadix. Female flowers—calyx ; spathe as in the male. Ament short-peduncled, globular. Perianth proper, as in *A. integrifolia*. Germs numerous, of the shape of a Florence flask ; style the length of the exterior coat of the germ. Stigmas subulate. Fruit compound, the surface pretty smooth ; the internal structure as in the genus, about the size of a man's fist or larger, and generally of an irregular, roundish form, when ripe yellow. Seeds oblong, involved in the number of integuments as in *A. integrifolia*. Roxburgh, 634 ; Brandis, 426.

This handsome tree occurs wild along the outer Himálaya up to 4,000 feet, and is occasionally cultivated in the plains. The male flower-heads are pickled and the fruit is eaten.

Celtis australis, Linn. ; *C. tetrandra*, Roxb. ; *C. caucasia*, Willd. *Kharak*, *kharaka*.

Belonging to the same natural order as the preceding. A middle-sized deciduous tree, with bifarious branches ; young leaves, branches, and petioles hairy. Leaves ovate or ovate-lanceolate, unequal-based, acuminate, more or less rough when full-grown, serrate, the lower third of the leaf often entire, 3 basal nerves, the midrib penniveined, blade 3-5 in., petiole $\frac{1}{2}$ in. long ; stipules subulate, caducous, shorter than petiole. Flowers yellowish-white, tetramerous or pentamerous, bisexual flowers axillary, pedicels more than twice the length of petiole, the male flowers on shorter pedicels, in lateral fascicles or short racemes, below the leaves, or in the axils of the youngest leaves. Drupe ovoid, $\frac{1}{2}$ in. long, putamen reticulate-rugose, seeds oily. Brandis, 428.

The kharak occurs wild in the outer Himálaya and is occasionally found planted in the plains. The flowers appear in March-April, and the fruit ripens in the rains. Brandis describes the fruit as 'insipidly sweet'; it is, however, eaten by all classes and esteemed. Towards the Satlaj, as observed by the same writer, a dark purple kind is called *roku* and a smaller yellow variety, *choku*.

Antidesma diandrum, Tulasne ; *A. sylvestre*, Wall. ; *Stilago diandra*, Roxb. The *amli*, *sarsheoti*, *sarsketi* of Garhwál, *dhakki*, *gúr-masuriya*, *ban-másuriya* of Oudh and Gorakhpur.

Belonging to the natural order *Euphorbiaceæ*. A small deciduous tree, branchlets, petioles, and under side of leaves along midrib, with scattered rust-coloured hairs, otherwise glabrous. Leaves lanceolate or ovate-lanceolate, shortly petiolate, 2-4 in. long, glabrous, shining, stipules lanceolate. Flowers greenish-yellow, male and female on short pedicels, in the axils of subulate bracteoles, spikes (racemes) terminal, solitary, or 2-3 together, slender ; male spikes 2-3 in long, female spikes shorter. Calyx cup-shaped, 5-dentate. Stamens 2-3. Drupes small, of a pleasant acid taste. Brandis, 447 ; Drury, F. P., III., 138 ; Roxburgh, 714.

Occurs wild in the *sál* forests along the foot of the Himálaya from the Ganges to the Rápti. Fruit ripens at Christmas. The leaves are acid and made into *chatni* and the fruit is eaten. *A. Ghæsembilla*, Gaertn., the *amli*,

mendla or *sarshori* of Bijnor (Brandis, 446; Drury, F. P., III, 125) yields a similar edible acid (*khatta-mitha*) fruit which is also used in medicine.

Briedelia retusa, Spreng.; *B. crenulata* Roxb.; *B. spinosa*, Willd.; *Cluytia spinosa*, Roxb. *Khaja* (Bijnor, Oudh, Gorakhpur), *kassi* (parts of Oudh), *gauli* (Garhwál).

Belonging to the natural order *Euphorbiaceæ*. A middle-sized or large deciduous tree, spinescent when young, branchlets and under side of leaves usually soft-tomentose. Leaves short-petiolate, elliptic-oblong, 3-6 in. long, midrib prominent, with 15-20 pairs of prominent, straight, parallel lateral nerves; stipules subulate, deciduous. Flowers monœcious, yellow, subsessile, crowded in lateral clusters, generally arranged in terminal panicle spikes. Petals of male flowers on long claws, lamina thick, obovate, lobed; of female flowers lanceolate. Fruit subglobose, green, nearly black when ripe, fleshy, $\frac{1}{2}$ in. diam., supported by the somewhat enlarged coriaceous calyx. *B. crenulata*, Roxb., with axillary flower-heads, is said to be diœcious by Roxburgh. At present I am inclined to regard it as a variety only, chiefly found in western India. Brandis, 449; Roxburgh, 705.

The fruit is eaten.

Phyllanthus Emblica, Linn.; *Emblīca officinalis*, Gærtn. *Aonla*, *amla*, *amlīka*.

Belonging to the natural order *Euphorbiaceæ*. Trunk generally crooked, when large as thick as a man's body. Branches thinly scattered in every direction; male branches spreading and drooping. Bark ash-coloured, scabrous. Leaves alternate, spreading, bifarious, pinnate flower-bearing, from one to two feet long, and about one and a half or two inches broad, leaflets very numerous, alternate, linear obtuse, entire, smooth, about three-fourths of an inch long, and one-eighth broad. Petioles striated, round. Stipules small, withering. Flowers minute, greenish yellow. Male flowers very numerous in the axils of the lower; leaflets, and round the common petiole below the leaflets, peduncled. Calyx six-leaved. Filament single. Anthers from three to five surrounding the upper part of the columnar filament. Female flowers few, solitary, sessile, mixed with some males in the most exterior axils that bear flowers. Calyx as in the male. Nectary cup-formed, embracing half the germ, border ragged. Germ superior, ovate. Style scarcely any. Stigmas three, two-cleft, segments a little two-cleft. Drupe fleshy, globular, smooth, six-striated. Nut obovate, obtusely triangular, three-celled. Seeds two in each cell. Roxburgh, 684; Brandis, 454.

Planted and wild throughout the plains and up to 4,000 feet along the Himálaya. The flowers appear in March-May and the fruit ripens in the cold-weather. The unripe fruit is pickled and eaten in preserves and under the name 'Emblīc myrobolans' is exported as a dye, tan, and medicine.

Securinega obovata, Müll.; *Phyllanthus retusus* and *virens*, Roxb. *Dhāni*, *baharcha*, *ghāri*, *gwāla-dārim*.

Belonging to the natural order *Euphorbiaceæ*. A large ramous unarmed shrub or small tree, wholly glabrous, branchlets angular. Leaves subsessile, oval or obovate, 1-2 in. long. Flowers diœcious, on slender pedicels, numerous, in axillary fascicles. Styles spreading or reflexed, deeply-cleft into two or three linear-segments. Fruit a white globose dehiscent berry, $\frac{1}{2}$ in. diam. Brandis, 455; Roxburgh, 679.

Occurs commonly in the plains and in the lower Himálaya up to 5,000 feet. Flowers appear May-June; fruit in July-October. The fruit of this species and of *S. leucopyrus* is eaten when ripe.

Castanea vulgaris, Lam.; *C. vesca*, Gærtn. Sweet chestnut. Introduced by Mr. (now Sir John) Strachey in Kumaon and in Dehra by Dr. Jameson,

grows and fruits well in Dehra Dún where the chestnuts are now brought to market. A very useful tree for its timber and fruit which in Italy forms an important part of the food resources of the people. Brandis, 491.

Corylus Colurna, Linn. ; *C. Jacquemontii*, Decaisne ; *C. lacera*, Wall. Hazel. *Kapási*, *bhotiya badām*.

Belonging to the natural order *Cupuliferae*. A small or moderate-sized tree; buds short, nearly hemispherical. Leaves glabrous, obovate, acuminate, base cordate, unequally serrate, main lateral nerves 10-12 pair, each nerve terminating in a more or less distinct lobé; blade 5-6, petiole 1-1½ in. long. Catkins fasciculate, scales obovate, acute, bearing along the midrib right 1-celled anthers on short often more or less connate filaments. Fruit in clusters of 2-3, involucre subcoriaceous, double, the inner sheathing, with numerous elevated ribs, cleft into linear-lanceolate serrate lobes with glandular hairs; the outer of several lacinate bracts. Brandis, 494.

This tree flourishes best to the west of the Ganges, though there is a good strip of hazel copse near Joshimath on the Alaknanda and in a few other places in Garhwál. It is said to bear freely only every third year when the crop is sufficient to admit of its being exported. The flavour of the kernel in many places is equal to that of the English hazel-nut.

Myrica sapida, Wall. *Kdyaphal*, *kaiphal*.

Belonging to the natural order *Myricaceae*. A moderate sized (always ?) evergreen dioecious tree, the current year's branchlets tomentose or pubescent. Leaves with a faint pleasant aromatic smell when rubbed or broken, alternate, lanceolate or oblanceolate, narrowed into a short petiole, those on older trees 3-5 in. long, entire, coriaceous, on the under side pale or rust-coloured, with numerous black resinous dots; petiole and midrib pubescent; main lateral nerves anastomosing by prominent intra-marginal and reticulate veins. Leaves on young plants and shoots 5-8 in. long, membranous, with large and sharp serratures, and more numerous, prominent, main lateral nerves. Male catkins cylindric, ½ in. long, sessile in lax axillary dropping racemes, as long as leaf or shorter. Female flowers in slender axillary spikes, styles red. Fruit a sessile ovoid drupe, several on axillary peduncles, ½ in. long, tuberculate, pubescent while young, glabrous when ripe, with scanty reddish pulp, which is composed of cylindric or clavate fleshy hairs filled with red juice mixed with fine dry hairs or fibres. Nut rugose, pitted. Brandis, 495.

This handsome evergreen occurs commonly all over the outer ranges 2,000-7,000 feet. The flowers appear October-December, and the fruit ripens in April-May. The fruit is one of the best of the wild fruits of the hills and is eaten by all classes.

Juglans regia, Linn. W. walnut. *Ak*, *akhor*, *akhot*, *kharot*.

Belonging to the natural order *Juglandae*. A large tree, youngest shoots velvety or with floccose pubescence. Leaflets elliptic oblong, entire (rarely serrulate), sub-coriaceous, glabrous, with tufts of hairs in the axils of nerves beneath, main lateral nerves prominent, 15-20 pairs; terminal leaflet largest, petiolulate, the lateral, 3-4 sometimes 5-6 pair, subsessile, nearly opposite, those near the base smaller; common petiole 6-12 in. long, glabrous or hairy. Male catkins appearing with the leaves in the previous year's axils and on the previous year's wood sometimes in pairs, green, pubescent, cylindric, 2-5 in. long; bracts pedicellate,

oblong, with 6 perianth-lobes, and 10-20 stamens, the buds of the coming year's catkins being ready-formed in the leaf-axils. Female flowers 1-3, limb of calyx minute, indistinctly toothed, petals linear-lanceolate, green, varying in length, sometimes half the length of ovary. Brandis, 497.

Cultivated throughout the hills and also occurs wild in many places. The fruit ripens in July-September and numbers several varieties, the best being the thin-shelled variety or *Kāghazi-akkrot*, found in the cooler valleys. It thrives better to the west of the Ganges than in Kumaon though Pithoragarh walnuts are good and all through the hills, the fruit forms a valuable article of export. An oil is also expressed from the kernels and is used for burning and for culinary purposes.

Ephedra vulgaris, Rich. ; *E. monostachya* and *distachya*, Linn.—*Khana, khanda*.

Belonging to the natural order *Gnetaceae*. A small rigid shrub, branches green or brownish, cylindric, with numerous raised scabrous lines, internodes 1-2, sometimes 2½ in. long, sheaths yellow or brown, with a white membranous edge and 2 acute teeth, shorter than sheath. Male spikes yellow, subsessile, in lateral or terminal, often whorled clusters ; anthers 6-10, the inner ones stipitate. Female spikes lateral or terminal, in pairs or whorled clusters, subsessile or short-pedunculate ; tube of inner sheath short, included within the outer bracts, 2-fid, lobes exerted. Fruit ovoid, succulent, sweet, pale, or bright-red when ripe, ¼ in. long, seeds 2, Brandis, 501.

This shrub occurs commonly in dry, stony places in the inner Himālaya. Watson reports that the fruit which is very sweet is eaten in Kumaon.

Borassus flabelliformis, Linn. Palmyra tree. *Tār*.

Belonging to the natural order *Palmae*. Young stems covered all their length with the dry leaves or lower part of petioles, old stems marked with the hard black long and narrow scars of the fallen petioles. Base of stem surrounded by a dense mass of numerous long cylindrical rootlets, consisting of a tough central vascular axis surrounded by a mass of fibres and a layer of thin brittle bark. Segments of leaves 60-80, parchment-like, smooth, shining, folded along the midrib, linear-lanceolate, connate to half their length, entire, at last bifid, 18-30 in. long, diameter of the leaf 3-5 ft. ; petiole 2-4 ft. long. Male spikes drooping, flowers delicate, pink and yellow, one flower only opening at a time in each bract. Fruit subglobose, depressed, 5-7 in. diam., smooth, shining, dark brown shaded with yellow, rind coriaceous, enclosing a yellow pulp mixed with tough straw-coloured fibres, which surround the seeds. Seeds 2-4, generally 3, broad, heart-shaped ; albumen white, cartilaginous. Brandis, 544.

Cultivated in the lower districts of these provinces. The flowers appear in March and the fruit ripens in April-May. The unripe seeds, the young plants and the pulp of the fruit all form a valued food-resource. The sap is collected in pots and used either for distillation, for making sugar, or for yeast.

Phoenix dactylifera, Linn. Date-palm. *Khajūr*.

Belonging to the natural order *Palmae*. A tall-tree, attaining 100-120 ft., trunk covered with the persistent bases of petioles, the foot often surrounded by a dense mass of root-suckers. Leaves grey, longer than those of *P. sylvestris* ; pinnæ 8-16 in. long, regularly distichous.

often approximate in twos or threes on the same side of petiole ; petiole grey, laterally compressed, almost flat. Male panicles white, compact, 6-9 in. long, on a short peduncle ; flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. long, sweet-scented ; sheaths outside with rusty down. Peduncles of female inflorescence $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, sometimes broader below, spikes 12-24 in. long. Fruit oblong, 1-3 in. long, generally reddish or yellowish-brown when ripe, pulp fleshy sweet. Numerous varieties cultivated, differing in colour, shape, and taste of the fruit. Seed cylindric, with a longitudinal furrow in front, and a small cylindric embryo in the middle of the rounded back. When the seed germinates, that end of the embryo which remains enclosed in the albumen enlarges at the expense of the albumen, the horny substance of which is converted into sugar and other soluble substances, which are absorbed by the embryo furnishing the substance for its early growth. The process is analogous to the conversion into sugar of the starch which fills the cells of the albumen of wheat, maize, rice, and bambus, during germination, with this difference, that the starch forms the contents of the cells, whereas, in the stone of the date, the walls of the cells themselves furnish the food of the growing embryo. Brandis, 352.

Cultivated sparsely in the Duáb (Saháranpur) and parts of Bundelkhand. The flowers appear in March-April and the fruit ripens in September-October. The date-palm can hardly be said to thrive well in these provinces, and the fruit is very inferior to that imported from the western Panjáb and Sind. *P. sylvestris*, the '*humilis*' of Madden, also yields an edible fruit. Brandis.

Musa sapientum, Linn. Plantain. *Kela*.

Belonging to the natural order *Musaceæ*. Spadix drooping ; spathes ovate, deciduous ; those of the female hermaphrodite, flowers of the wild plant often wither and remain until the seeds are ripe ; but in the cultivated varieties they are always deciduous. For a description of the wild species see Roxburgh, 223.

The plantain and banána are derived from the same stock and are mere varieties, and indeed the latter name is practically unknown in India. There are several varieties grown in these provinces, but none attain the perfection that characterises those produced in Bengal. The nearer the Bengal frontier the better they are. The *Champa* variety is one of the best and next comes the small variety known as *Chini-champa* which is about the size of a thumb and occurs in thick compact clusters. A large reddish variety is known as the *ram-kela*, somewhat greasy and insipid in flavour when over ripe. The *Dhakka* variety is seldom grown in these provinces but is often imported. In the hills there are several good varieties cultivated and the wild plant occurs as far north as the valley of the Káli under Askot in Kumaon.

Dendrocalamus strictus, Nees ; *Bambusa stricta*, Roxb.—Bambu—*Bâns*, *basila*.

Belonging to the natural order *Gramineæ*. A middle sized, generally deciduous bamboo, stems with small cavity, or entirely solid, closely packed in dense clumps, the lower part of stem often variously bent, with fasciculate, stiff, horizontal, generally leafless branches, the upper part spreading out in all directions, often curved downwards, or nearly horizontal, with fasciculate slender flexuose solid branches, the leaves on fasciculate branchlets enclosed in co-

riaceous shining persistent sheaths ; joints, 12-18 in long, 1-3 in. diam. Sheaths of young shoots shorter than joints, glabrous, shining outside, tapering into a triangular apex. Leaves distichous, hairy beneath, rough and often hairy above, exceedingly variable in size, generally middle-sized, 3-9 in. long, $\frac{1}{2}$ -1 in. broad, with 6 pairs of secondary nerves, and no transverse veins. Flowers annually, 1 or a few stems of each lump only producing flowers, often mixed with leaf-bearing branches. Spikelets spinescent, hairy, forming, with a number of single spikelets, dense globose spiny heads arranged in long interrupted spikes, joints between the flower-heads about 1 in. long. Empty glumes 2-6, flowering glumes 2-3, generally 2, spinescent, hairy. Palra of lower flower 2-keeled. keels pilose, of upper flower convex, not keeled, 8-nerved. Ovary stipitate, hairy, style long filiform. Caryopsis brown, shining, ovoid, $\frac{1}{4}$ in. long, narrowed into the persistent hairy style, pericarp (perigynium, Munro), coriaceous, separable from the seed, narrowed into the hairy persistent base of style. Brandis, 529.

The bambu is cultivated throughout the plains and affords the most valuable part of the minor forest produce along the foot of the hills. It is noticed here only because the tender shoots (*báns-ka-kullí*) are eaten in times of scarcity.

F.—Parts of wild plants used as food in these provinces.

The following list gives the wild plants more commonly used as food in these provinces. Most of them are had recourse to only in seasons of scarcity, but some of them at all seasons, more specially the lotus, yams and wild millets:—

Nymphæa lotus ; *kumud.*
 ——— *stellata* ; *nilofar.*
Nelumbium speciosum ; *kanwal.*
Triumfetta rhomboidea ; *manphora.*
Tribulus terrestris ; *gokhru.*
Leea aspera ; *kumáli.*
Sesbania grandiflora ; *básna.*
Pueraria tuberosa ; *bilái-kand.*
Flemingia congesta ; *mús-kela.*
Cassia Tora ; *panwár, banár.*
Trianthema monogyna ; *bish-khopra.*
Hydrocotyle asiatica ; *thalkuri.*
Mussaenda frondosa ; *babtna.*
Ipomœa sessiliflora ; *hara.*
 ——— *reptans* ; *kalmi-ság.*
Solanum verbascifolium ; *asheta.*

Asteracantha longifolia ; *talmakhána.*
Celosia argentea ; *siráli.*
Digera arvensis ; *das.*
Euphorbia angustifolia ; *dádkhila.*
Urtica parviflora ; *berain.*
Aloe vulgaris ; *gaikwár.*
Commelyna communis ; *kána.*
Dioscorea sagittata ; *tarúr.*
 ——— *versicolor* ; *genthi.*
 ——— *pentaphylla* ; *kánta-dlu.*
Arum nymphaeifolium ; *jal-kach-dlu.*
Oplismenus colonus ; *sáwank.*
Dactyloctenium ægyptiacum ; *makra.*
Cynodon Dactylon ; *dúbh.*
Saccharum Sara ; *sarhar.*
Scirpus Kysoor ; *kaseru.*

Nymphæa Lotus, Linn ; *N. rubra*, Roxb. ; *N. Devoniensis*, Hook. ; *N. edulis*, D. C. Lotus. *Koi, kumud, gulhar.*

Belonging to the natural order *Nymphaeaceæ* and sub-order *Nymphaeæ*. Leaves sharply sinuate-toothed, 6-12" broad ; young sagittate ; flowers white rose or red, very variable in colour ; sepals obtuse 5-10 ribbed, oblong ; petals linear or ovate-oblong ; anthers without appendages, stigmatic rays with appendages ; filaments broadly dilated at base ; pollen smooth. Seeds broadly ellipsoid rough, Hooker, Fl. Ind., I, 114 ; Roxburgh, 427-28 ; Drury, F. P., I, 80 ; Birdwood, 134.

Common throughout the plains. This and its variety *N. pubescens*, Willd. (= *N. sagittata*, Edge.), having the leaves puberulous or pubescent beneath and flowers smaller, are found all through the plains in tanks and jhils. The root,

Fruit, leaves, flowers, and stalk are used as a vegetable or pickle and in curries; a kind of arrow-root is made from the underground stems and roots. It also occurs in Egypt and, according to Birdwood, is said to be the *lotos* of Theophrastus and Egyptian lotus of Dioscorides, Herodotus and Pliny. The red variety is Roxburgh's *N. rubra* (427) and Drury (U. P.) 324.

Nymphaea stellata, Willd.—Lotus. *Ntlofar*, *naufar*, the *bambher* of Bijnor.

Belonging to the same order as the preceding. Leaves quite entire or obtusely sinuate-toothed, orbicular or elliptic, often blotched with purple beneath, lobes acute or obtuse. Flowers variously coloured, blue, white, rose, or purple, slightly odorous, 1-10" diameter. Sepals many veined, not ribbed, often streaked with fine short purplish lines; petals 10-30 linear-oblong or lanceolate acute or taper-pointed; anthers with long appendages, stigmatic rays 10-30 terminating in short horns without appendages; stamens 10-50, pollen smooth. Seeds substrate. Hooker, *ibid*, 114.

Hooker notes three varieties:—

Var. 1. *cyanea*, Roxburgh (428), flowers medium sized blue scarcely odorous, the *sundi* and *nila-padma* of Bengal.

Var. 2. *parviflora*, H. f. et. T.; *N. stellata*, Willd.; flowers usually smaller, blue. Roxb., 428.

Var. 3. *versicolor*, *id.*; *N. versicolor*, Roxb. (428); *N. punctata*, Edge.; *N. Edgeworthii* and *N. Hookeriana*, Lehm.; flowers larger, white, blue, purple or flesh coloured, stamens very many.

Occurs wild all over the plains and affords a food product similar to the preceding. Seeds are used also in medicine; see *Drugs*.

Nelumbium speciosum, Willd.; *Nymphaea Nelumbo*, Linn.; *Nelumbo indica*, Poir.; *Cyamus Nelumbo*, Smith; *C. mysticus*, Salis. Lotus. *Kanwal*, *doda-kanwal*, *padam*, *ambaj*, *kamal-kukri*, *besenda* (*Bijnor*).

Belonging to the same natural order as the preceding. Peduncles and petioles 3-6 ft. high, full of spiral vessels, smooth or with small scattered prickles. Leaves 2-3 feet diam., membranous, glaucous, cupped. Flowers 4-10 in. diam., white or rose. Petals elliptic, concave, veined. Fruiting torus 2-4 in. diam. Ripe carpels from the size of a pea to a small cherry. Hooker, Fl. Ind., I., 116; Drury (U. P.), 321; Roxburgh, 450; Birdwood, 136.

The stalk, leaves and roots are eaten as a vegetable. The roots are sliced and either boiled and strained and fried in clarified butter or made into pickles. The seeds are used in medicine see *Drugs*: and are also eaten raw, roasted or boiled. The leaves are used as plates. This lotus occurs in the hills and plains; Naukuchiya Lake near Naini Tal. According to most authorities this is the mystic lotus of the Greeks and Egyptians, and it is the sacred lotus of the Hindus. Moorcroft states that this plant supports 5,000 people for eight months of the year in Kashmir.

Triumfetta rhomboidea, Jacq. ; *T. angulata*, Lam. ; *T. Bartramia* and *T. trilocularis*, Roxb. ; *T. vestita*, Wall. The *manphora* and *jhinjhru* of Bijnor.

Belonging to the natural order *Tiliaceæ*. Herbaceous or suffruticose. Leaves ovate rhomboid or cordate, 3-7 nerved, apex acute or somewhat 3-lobed, serrate, variable in amount and quality of pubescence. Flowers $\frac{1}{2}$ in. yellow, in dense cymes. Pedicels short. Flowerbuds oblong, clubshaped, apiculate. Sepals oblong, apiculate. Petals oblong, ciliate at the base. Stamens 8-15. Capsule the size of a small pea, albedo-tomentose between the spines, spines hooked, glabrous or ciliated. Some of the forms of this protean species are superficially so different that they may be mistaken for distinct species. On examination, however, of large suites of specimens from various localities, it will be found that the forms merge one into the other. Hooker, Fl. Ind., I, 395 ; Roxburgh, 390.

Occurs throughout the plains and in the hills up to 4,000 feet. The leaves and seeds are eaten. *T. pilosa*, the *leskwa-kumariya* of Kumaon, is also common.

Tribulus terrestris, Linn. ; *T. lanuginosus*, Linn. *Gokhru* (Bijnor).

Belonging to the natural order *Zygophylleæ*. Annual or biennial. Peduncles shorter than the leaves ; leaflets 5-7 pairs, subequal, mucronate. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. in diameter ; petals often not exceeding the calyx. Cocci with 2 long and 2 short spines, very variable glabrous or hairy, mucronate. Stigmatic lobes longer than the diameter of the spine. Hooker, Fl. Ind., I, 423 ; Drury, F. P., I, 213 ; Aitch., 26.

The prickly fruit is made into meal in seasons of scarcity, and the young leaves and stems are eaten as a pot herb : see *Drugs*. Common in the plains everywhere, the sub-montane tract and the lower hills.

Leea aspera, Wall. *Kumala* (of sub-montane tract) and *kumali* or *kurmali* (of Kumaon).

Belonging to the natural order *Ampelideæ*. Stems herbaceous, erect, 2-4 feet, pubescent, not crisped. Leaves membranous or subcoriaceous when old. Leaflets on long stalks 3-6 by 2-3" cordate-ovate, suddenly acuminate, crenate-serrate, prominently penninerved, scabrous on both sides and with scattered white appressed hairs, between the nerves above, nerves parallel straight, one running to every other serrature. Cymes small, pubescent. Anthers distinct. Fruit the size of a large currant, black, succulent. Hooker, Fl. Ind., I, 666.

Occurs in Kumaon up to 6,000 feet ; rare outside the Siwálík range, is found also in the Oudh forests. The flowers appear June-July ; the fruit is eaten and is pleasant to the taste.

Sesbania grandiflora, Pers. ; *Agati grandiflora*, Desv. ; *Æschynomene grandiflora*, Linn. ; *Coronilla grandiflora*, Willd.—*Básna*, *bako*.

Belonging to the natural order *Leguminosæ* and sub-order *Galegeæ*. A short-lived, soft-wooded tree, attaining 20-30 feet. Nearly glabrous, extremities and young leaves slightly pubescent. Common petiole unarmed, 6-9 in. long ; leaflets opposite, on short petiolules, 10-30 pairs, oblong, obtuse, and often mucronate, glaucous, 1-1 $\frac{1}{2}$ in. long. Racemes short, with 2-4 very large flowers, 3 in. long, red or white. Calyx campanulate, from a turbinate base, with short, unequal teeth. Standard ovate, rather shorter than the keel. Pods upwards of a foot long, $\frac{1}{2}$ in. broad, compressed, tetragonous. Brandis, 137 ; Hooker, Fl. Ind., II, 115 ; Roxburgh, 569 ; Drury, (U. P.) 20.

Cultivated in the plains of these provinces. Flowers March-April. The tender leaves, pods and flowers are eaten as a vegetable and in curries. The

bark, leaves and flowers are also used in native medicine ; see *Drugs and Pharm.* 78. *S. aegyptiaca*, Pers., the *jait* of these provinces and *dhandiyāyan* of Rohilkhand, is also cultivated in the plains and Kumaon. There are two varieties, one with a purple vexillum and the other with a yellow vexillum spotted and streaked with black. The leaves are, however, chiefly used in native medicine (Hooker, *l. c.*, 114 ; Brandis, 137 ; Drury (U. P.), 404).

Pueraria tuberosa, D. C. ; *Hedysarum tuberosum*, Roxb. The *bilāi-kand*, *billi* and *birālipāna* of Kumaon ; *surdā* and *surdāt* of Jaunsār ; *stāli*, *badār* (west).

A twining shrub or herb belonging to the natural order *Leguminosae* and sub-tribe *Galacticae*. Root very large, tuberous. Stems shrubby, the branches finely grey-downy. Stipules minute, deciduous, cordate-ovate ; leaflets membranous, roundish, $\frac{1}{2}$ -1 ft. long ; green, glabrescent above, densely clothed with whitish appressed hairs beneath. Flowers in dense virgate leafless often paniced racemes, reaching 6-9 in. long ; pedicels very short, densely fascicled. Calyx $\frac{1}{2}$ - $\frac{3}{4}$ in. long, densely silky. Corolla bluish, not quite twice the calyx ; limb of standard orbicular, distinctly spurred. Pod 2-3 in. long, membranous, flat, 3-6-seeded, clothed with long grey silky bristly hairs. Hooker, *Fl. Ind.*, II., 197 ; Brandis, 141 ; Roxburgh, 580 ; Drury (U. P.), 371.

Extends along the foot of the hills ascending up to 4,000 feet. The large tuberous yam like roots are largely exported from Kumaon to the plains both as an article of food and for use in native medicine. Madden states that this fine climber occurs in profusion along the exterior belt of the Kumaon hills under the vernacular names above given. Children are employed in digging up the tubers for exportation.

Flemingia congesta, Roxb. ; *Crotalaria macrophylla*, Willd. ; *Rhynchosia crotalarioides*, D. C. ; Var. *F. procumbens* Roxb. The *mās-kela* of Kumaon.

Belonging to the natural order *Leguminosae* and tribe *Cajanaceae*. An erect woody shrub, 4-6 ft. high, with terete, glabrescent old and rather angular sulcate silky young branches. Stipules linear, $\frac{1}{2}$ in., caducous ; petiole 1-4 in., sulcate down the face, not winged ; leaflets subcoriaceous, thin not plicate, 4-6 in. long, narrowed to a long point, and downwards to a rather rounded base, green and glabrous above, thinly grey-silky beneath. Racemes oblong, dense, 1-2 in. long, sessile, often fascicled ; bracts lanceolate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, silky on the back, like the calyx, deciduous, not at all rigid ; pedicels very short. Calyx, $\frac{1}{2}$ - $\frac{3}{4}$ in., densely clothed with appressed shining pale brown silky hairs ; teeth linear-lanceolate, the lowest exceeding the others. Corolla scarcely exerted ; keel obtuse. Pod oblong, $\frac{1}{2}$ in. long, obscurely downy, 2-seeded. Hooker, *Fl. Ind.*, II., 229 ; Roxburgh, 571.

There are four varieties of this plant noticed by Hooker, of which *F. procumbens*, Roxburgh, a trailing diffuse form, belongs to the *F. nana* variety and is common in the hills from 2-5,000 feet. The pods are eaten.

. *Cassia Tora*, Linn. ; *Senna Tora* and *toroides*, Roxb. ; *Cassia obtusifolia*, Linn. ; *C. fatida*, Salisb.—*Panwār* (Bijnor), *bandr* (Kumaon), *chokaunda* (leaves).

An annual weed growing up into an undershrub, glabrous. Leaves distinctly petioled ; leaflets 1-1 $\frac{1}{2}$ in., glaucous, membranous, glabrous ; stipules large, linear-subulate, caducous. Flowers usually in nearly sessile pairs in the axils of the leaves, the upper crowded. Corolla small, bright yellow. Pods $\frac{1}{2}$ - $\frac{3}{4}$ ft. by $\frac{1}{2}$ in., membranous, the sutures very broad, the seeds flattened in the same direction as the pod. Hooker, *Fl. Ind.*, II., 263 ; Roxburgh, 351.

Occurs wild up to 5,000 feet in the hills and also in the plains. The leaves and stems are eaten as greens. The root, leaves, and seeds are used in native medicine and the seeds in preparing a blue dye.

Trianthema monogyna, Linn.; *T. obcordata*, Roxb.; *T. pentandra*, Var. D. C.; *Bishkhopra* (Bijnor).

Belonging to the natural order *Ficoideæ*. Glabrous. Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., obovate; petiole $\frac{1}{4}$ in. Flowers solitary. Calyx-lobes obtuse, cuspidate. Stamens 10-20. Capsule $\frac{1}{4}$ in., scarious below, beak exerted coriaceous somewhat mitriform, adnate to the enclosed seed, lower part 3-5 seeded. Seeds black, scarcely shining, with concentric broken undulating raised lines. Hooker, Fl. Ind., II., 660; Roxburgh, 385.

Occurs in the plains and along the foot of the hills and ascends in Kumaon to 2,000 feet. The leaves and stems are eaten as a vegetable, though noxious and said sometimes to produce paralysis and diarrhœa. This plant is also used in native medicine. The same vernacular name is given to *Primula speciosa* in the Panjâb. *T. pentandra*, Linn., is the hill species.

Hydrocotyle asiatica, Linn.; *H. Wrightiana*, Wall.; *H. lurida*, Hance. *Thalkuri*.

A plant belonging to the natural order *Umbelliferae* and sub-order *Heterosciadie*. Leaves half to $\frac{3}{4}$ in. in diameter, usually glabrous or nearly so; petiole pubescent or glabrous. Peduncles about $\frac{1}{4}$ in., often 2-3-nate, laxly pubescent or glabrous; bracts $\frac{1}{2}$ - $\frac{3}{4}$ in., not scattered among the pedicels (as in *Eu-Hydrocotyle* and in *Araliaceæ*). Fruit $\frac{1}{2}$ - $\frac{3}{4}$ in. Carpels oblong, subcylindric, curved, slightly compressed, much longer than broad, reticulate-rugose, often crowned by the subpersistent petals, each with 9 curvilinear subsimilar ridges, and 2 within the commissure; pericarp thickened, woody, white. Seed compressed laterally. In this species it seems to be the endocarp that is so greatly thickened, and that is adnate to the exocarp, thus invalidating one of the most uniform distinctions between *Umbelliferae* and *Araliaceæ*. Hooker, Fl. Ind., II., 669; Roxburgh, 270; Drury (U. P.), 256.

Occurs wild throughout India up to 2,000 feet in moist shady places, especially near tanks. The leaves are used as greens and also in native medicine: see *Drugs*.

Musscenda frondosa, Linn.; *M. flavescens*, Ham. *Babina*.

Belonging to the natural order *Rubiaceæ*. Erect shrub, leaves oval, acuminate, from-villous or hirsute to nearly glabrous: branches and corymbs when young pubescent or tomentose: calyx-segments subulate, much longer than the ovary, hirsute, one of them in some of the axillary flowers of the corymb produced into a large or villous leaf: corolla externally hirsute: style the length of the tube: fruit at first hairy, afterwards glabrous, obovoid: flowers middle-sized, occurs throughout the plains of these provinces. The leaves are eaten as a pot-herb, gold-coloured. Drury, F. P., I., 528; Roxburgh, 187.

Occurs throughout the plains of these Provinces, the leaves are eaten as a pot herb.

Ipomœa sessiliflora, Choisy; *Convolvulus sphaerocephalus*, Roxb. *Harar-khâri*, *kara* (Bijnor) *bhânwar*.

Belonging to the natural order *Convolvulaceæ*. Root annual. Stem and branches twining, round; young shoots clothed with short soft hairs. Leaves sagittate-ovate, posterior lobes large and rounded, both the sides and margins somewhat hairy; length from one to four

lobes. Petioles hairy, channelled, about half as long as the leaves. Peduncles axillary, solitary, very short, or almost wanting, bearing many small, rose-coloured, sessile flowers, forming globular heads. Bracts or involucre many, linear, recurved. Calyx, leaflets as long as the corol, hairy, tapering to a rather long, recurved point. Corol having the border slightly marked with ten indentures. Anthers half hid in the tube of the corol. Stigma of two round lobes. Capsule globular, villous, size of a marrowfat pea, two-celled, with two light-coloured seeds in each. Roxburgh, 159; Drury, F. P., III, 312.

Occurs wild in the plains and lower hills and is sometimes sown with wheat. The leaves and stems are eaten as a vegetable and the leaves are used in medicine.

Ipomœa reptans, Poir.; *Convolvulus reptans*, Linn.; *C. repens*, Willd. *Kalmi-sdg, nâri*.

Belonging to the natural order *Convolvulacæ*. Stems creeping, or floating on the water, annual, or biennial, round, piped, jointed, smooth, many fathoms long. Leaves alternate, long-petioled, oblong-ovate, pointed, entire, smooth, from four to six inches long. Peduncles axillary, erect, round, smooth, from three to six-flowered. Flowers large, beautiful rose colour. Lobes triangular. Tube of the corol between bell and funnel form. Base of the filaments woolly. Stigma two-headed. Roxburgh, 162.

Common with its rose-coloured flowers, floating in tanks in the plains the leaves are eaten as a vegetable, and occasionally the root also those of *I. gangetica* with yellow flowers, and *I. striata*, the *ban-kalmi* of the plains.

Solanum verbascifolium. Linn.; *S. pubescens*, Roxb.; *S. erianthum*, Don; *S. bicolor*, Willd. The *asada* and *asheta* of the submontane tract.

Belonging to the natural order *Solanacæ*. Shrubby, leaves ovate-oblong, acuminate, entire, tomentose, surface discoloured; axils leafless; corymbs sub-terminal, dichotomous, peduncled; calyx half 5-cleft; flowers pale yellow or dirty white. Drury, F. P., II, 347; Roxburgh, 189.

Occurs wild along the foot of the hills, ascending to 6,000 feet. The fruit is eaten in curries.

Asteracantha longifolia, Nees; *Barleria longifolia*, Linn.; *Ruellia longifolia*, Roxb. *Tal makhâna* (Bijnor).

Belonging to the natural order *Acanthacæ*. Roots often biennial. Stems herbaceous, ascending, or erect, ramous, jointed, a little flattened, hairy, from two to three feet high. Branches opposite, like the stem, and also nearly erect. Leaves, an exterior, opposite, sessile pair at each joint, within these, and sub-alternate with the spines, several small ones in a verticel; all are linear-lanceolate; margins often revolute, hairy, I may almost say, bristly; size various. Spines six in each verticel, between the leaves and flowers, awl-shaped, spreading, and a little recurved. Flowers verticelled, numerous, sessile, large, of a bright-blue, or in some varieties rose-coloured. Bracts lanceolate, margins and outside bristly. Calyx of two pairs of nearly equal leaflets, clothed with soft hair. Corol two-lipped; lips nearly equal; upper two-parted, with the division emarginate, the under one three-parted, with the divisions also emarginate, in the under a coloured body like a large oblong anther. Filaments connected at the base; second pair larger than usual in the genus. Anthers sagittate. Stigma subulate involute, with a fissure on the upper side. Roxburgh, 475.

Occurs very commonly wild in the plains where the seeds are collected and eaten.

Celosia argentea, Linn. *Sarwāli* (Bijnor), *sirdli* and *ghogiya* (Kumaon).

Belonging to the natural order *Amaranthaceae*. An erect annual plant. Leaves lanceolate to oblong; spikes sub-cylindric, scarious; nectary with five short toothlets, alternate with the long antheriferous divisions. Roxburgh, 228; Drury, F. P., III., 15.

Leaves and stems are used as greens: common in both hills and plains: wild; the seeds are officinal.

Digera arvensis, Forskahl; Var. *perennans*; *Achyranthes polygonoides*, Retz; *A. digera*, Poir.; *Chamissoa commutata*, Spreng.; *Desmocheta muricata*, R. W. The *das* of Bijnor.

Belonging to the natural order *Amaranthaceae*. Stem perennial, irregularly tetragonal, glabrous: leaves alternate, ovate, roundish, often lanceolate, acute, sometimes rufescent at the margin: spikes erect, stiff: bracts ovate, whitish, lower one very concave: sepals twice as long as the bracts, sometimes 4 by abortion, ovate-lanceolate, exterior ones acute, 3-nerved, inner ones shorter, narrower, 1-nerved: anthers exserted, red: pistils reddish: capsule hard, 2 toothed at the apex, keeled, tubercled, greenish: crests shorter than the fruit, green: lower branches recurved, upper ones incurved, subtrilobate: seed not shining, brown: flowers small, red. Drury, F. P., III., 29.

A common weed of the plains and sub-montane tract. The leaves and stems are eaten as a vegetable in seasons of scarcity. The leaves and tender tops of *D. muricata*, the *lata-muhuriya*, are also eaten.

Euphorbia angustifolia, *E. lanceolata*, Rottl.; *E. dracunculoides*, Roxb. *Dādhlia-ghās*, the *dādhlia* and *mahābār* of Kumaon.

Belonging to the natural order *Euphorbiaceae*. Annual usually many-stemmed: stems erect, leafy, from straightly branched axils: rays of the umbel 2-3, elongated, many time dichotomous: leaves narrowly linear-lanceolate, acutish, attenuated at the base, floral ones abbreviated, lanceolate from a broader base: lobes of the turbinate involucre ovate, denticulate-ciliate: glands semilunate, transversely broader horns of equal length, or shorter than the breadth of the glands: styles free, short, 2 cleft: capsule depressed, deeply 3-furrowed: seeds oblong, blackish, leprous with whitish tubercles, often meeting in lines at the base. Drury, F. Pl., III., 129; Roxburgh, 394.

Occurs wild in the plains, along the sub-montane tract and in the lower hills, up to 6,000 feet. The seeds are eaten in times of scarcity and are officinal under the name *sudāb*.

Urtica parviflora, Roxb. The *berain* of the Bhābar and *shishona* of Almora and generally *bichhu* of the plains.

Belonging to the natural order *Urticaceae*. Root ramous perennial. Stems herbaceous, erect, about three feet high, and with but few branches, four grooved on the sides, but with few angles rounded, and every part armed with numerous, strong, very sharp, clear, stinging bristles. Leaves opposite, petioled, ovate, and ovate lanceolate, grossly serrate, wrinkled, about three inches long, by one broad. Petioles scarcely half the length of the leaves, armed. Stipules opposite, entire, oblong, conic. Female flowers—panicles quatern, that is, two in each axil, as in *U. diæa*, which it most resembles. Flowers very minute, green. Calyx of two opposite pairs of oval leaflets. Stamina none. Germ oval. Style none. Stigma a pencil of white hairs. Roxburgh, 654.

Very common throughout the sub-montane tract and hills, where the leaves are cooked and eaten as a spinach.

Aloe vulgaris. Lam. ; *A. barbadensis*, Mill. Common aloe. *Gaiikwar*.

Belonging to the natural order *Liliacæ*. Stem short ; leaves fleshy, amplexicaul, first spreading, then ascending, lanceolate, glaucous-green, flat, obovate, convex below, armed with distant reddish spines perpendicular to the margin : the parenchyma slightly coloured brown, and very distinct from the tough leathery cuticle spikes cylindrical ovate : flowers at first erect, then spreading afterwards pendulous, yellow with the three inner segments at the apex somewhat orange, not longer than the stamens. Drury (U. P.), 27.

Introduced and now planted and wild in the plains and lower hills. The seeds and pulp (*gūda*) of the leaves are eaten in seasons of scarcity and are also used in medicine.

Commelyna obliqua, Linn. ; *Ephemerum dipetalum*, Kæmp. *Korna*, *kāna* (Bijnor), *kāna* and *kanjura* (Kumaon).

Belonging to the natural order *Commelynacæ*. Polygamous, creeping. Root fibrous. Stems numerous, creeping, dichotomous, jointed round, smooth ; very various in length. Leaves ovate-lanceolate, smooth, alternate, sessile on tabular, vaginated sheath, acute ; margins waved ; smooth on both sides with delicate parallel veins running lengthways on the upper side ; 2-4" long ; mouths of the sheathing petioles, a little ciliate. Spathes terminal or sub-fascicled, semi-cordate. Roxburgh, 57 ; Drury, F. P., III., 310.

Leaves and stems are used as greens during seasons of scarcity. Common in hills and plains : wild.

Dioscorea sagittata, Royle. *Tair* and *tarūr* (Kumaon) ; *tarūr* (plains). Tam.

Belonging to the natural order *Dioscoreæ*.

Yields a yam similar to *Batatas edulis* which lies from three to six feet deep in the soil and keeps better than the others.

Dioscorea versicolor, Wall. ; *D. bulbifera*, Linn. ; *D. trinifolia*, Salist. ; *D. pulchella*, Hohen. ; *Helmia bulbifera*, Kunth. *Gt.hi* (Bijnor) ; *genthi*, *g-jir*, *ghanjin* (Kumaon).

Belonging to the same order as the preceding. Leaves alternate, deeply cordate, acuminate, 7-nerved ; the exterior nerves 2-cleft ; transverse veins reticulated ; stem bulbiferous ; male spikes fascicled. Drury (U. P.) 1-3, and F. P., III., 277.

Occurs in these Provinces, the bulb on the stem and root is eaten as a vegetable. Flowers in the rains. This climber is of considerable interest, as its large tubers furnish the deliciously fragrant yam which supplies great part of the food of the Bhuksas in Moradabad and Bijnor when grain is scarce. The plant is common throughout the forest and its tubers, which grow to several pounds' weight, are got at by digging from two to six feet. To remove their original acidity, they are always steeped for a night in ashes and water before being cooked. As a curious instance of the power of vegetation, the following may be mentioned. A piece of a tuber about half a pound in weight having been put aside among some specimens, soon after the rains commenced a young stem a foot long had shot out through the folds of the paper in which it was wrapped. It was then tied up in a woollen stocking, without a particle of soil, hung up in a verandah and liberally watered. In six weeks, until it was

unfortunately broken off, it sent out to a length of nearly twenty feet its climbing stem with abundance of leaves, but without manifesting any disposition to flower. This species of yam (allied to the common cultivated *ratalá* of these parts, and to the West Indian yam) is found in many countries within and near the tropics, and it, as well as several of its wild congeners, is used as food in various other parts of India. Its roots largely helped to support the multitudes of starving poor who were employed on the relief works near the Mohan Pass across the Siwálíks to Dehra Dún, in 1861 (Dr. J. L. Stewart).

Dioscorea pentaphylla, Willd. Five-leaved yam. *Tagúna, idhuli* (Kumaon), *kánta-álu* (plains).

Belonging to the natural order *Dioscoreaceæ*. Tubers oblong; stems herbaceous; twining; prickly; leaves digitate, downy; male flowers panicle, greenish white, fragrant; female ones spiked. Roxburgh, 73v; Drury (U. P.), 194, and F. P., III., 276.

Flowers in the rains: tubers are large, white, wholesome and palatable, but do not appear to be cultivated.

The following wild species are recorded from Kumaon:—

D. quinata, the *magiya* or *muniya*, of Kumaon, having white edible tubers.

D. deltoidea, the *gún* of Kumaon.

D. aculeata, the *man-álu* of the upper districts: Drury, F. P., III., 276.

Arum nymphaeifolium, Roxb.; *Caladium nymphaeifolium*, Willd. *Sár kachu, jal-kash álu*.

Belonging to the same natural order as the preceding. Stemless. Leaves peltate, ovate repand, semi-bifid at the base. Scape shorter than the petioles. Spathe much longer than the spadix, sub-cylindric, erect; club slender, acute, scarcely half the length of the antheriferous part of the receptacle. Anthers many-celled. Roxburgh, 624.

Roxburgh doubts if this can be reckoned anything more than a large aquatic variety of *Colocasia*. In Bengal it is rarely cultivated, but found wild in abundance on the borders of lakes and pools of fresh water. Every part of this plant is eaten by the Hindus. The root or rather subterraneous stem often grows to the length and thickness of a man's arm. The petioles, scape and leaves, are of a reddish colour, and the plants considerably larger than most other varieties of *Colocasia*; yet the leaves are narrow in proportion to their breadth. The only good specific mark to know it from *Colocasia* by is the shortness of the club of the spadix. See also *C. antiquorum* under *Greens*.

Opismenus colonus, H. B.; *Panicum colonum*, Linn. *Sáwank, soun* and *jangli-mandira* (Kumaon); *jangli-sáwank* or *sawan* (plains).

Belonging to the natural order *Gramineæ* and tribe *Panicææ*. Culms below resting on the ground and rooting, above sub-erect branched, a little compressed, smooth; leaves short, smooth, tapering from the base to a sharp point; spikes compressed, secund 7-9, alternate

distant ; spikelets in four series ; glumes scabrous, mucronate, unequal, 3-nerved. Drury, F. P., III., 570 ; Roxburgh, 99.

Occurs commonly in hills and plains and entirely covers the fallow *már* land in various parts of Bundelkhand. The seed is gathered in September or October by the poorer classes who sweep the surface of the grass for the grain which easily falls out into a basket held to collect it. Bellew states that in the Peshawar valley this seed is especially eaten during Hindu fasts and that it with milk had for thirty years constituted the chief food of the Akhúnd of Swát, for whom it is cultivated (S).

Dactyloctenium ægyptiacum, Beauv. ; *D. mucronatum*, Willd. ; *Eleusine ægyptiaca*, Roxb. ; *E. cruciata*, Linn. ; *Cynosurus ægyptius*, Linn. *Makra* (Bijnór).

Belonging to the natural order *Gramineæ* and tribe *Chlorideæ*. Root fibrous and cæspitose : culms ascending, proliferous, branched, sometimes rooting, 3-12 inches ; spikes short, 2-4, scarcely 1-inch ; rachis terminated by a mucro : spikelets imbricated, 3-5 flowered, awns of the glumes longer than the spikelet. Drury, F. Pl., III., 609 ; Roxburgh, 116.

Occurs wild in most districts of the plains : the seeds are eaten in times of scarcity.

Cynodon Dactylon, Pers. ; *C. stellatus*, Willd. ; *Panicum Dactylon*, Linn. ; *Digitaria stolonifera*, Schrod.—*Dábh, haridli*.

Belonging to the natural order *Gramineæ* and tribe *Chlorideæ*. Root turfy or stoloniferous : Culms creeping, compressed, rooting, branched and giving rise to new plants : leaves distichous and with the sheathes hairy : ligula ciliated : spikes digitate, turn, in threes or fours, linear smooth. Drury, F. P., III., 610.

The seeds of this common grass are collected and eaten in times of scarcity.

Saccharum Sara, Roxb. *Sarhar, sarúr*.

Belonging to the natural order *Gramineæ* and tribe *Andropogoneæ*. Erect, 8'-12' high. Leaves flat with prickly margins. Panicles dense, sub-verticelled ; ramifications decom pound. Flowers paired, one of the pair sessile. Corol 3-valved. Roxburgh, 82.

This species differs from *S. spontaneum*, Linn. the *kás* of the plains and *jhdása* of the hills, by being a stronger reed, the leaves much larger, with very hispid margins, the ramifications of the panicle decom pound, and a corol of three valves. Culms perennial, erect, from six to sixteen feet high, often near the base as thick as the little finger, smooth, remarkably strong. Leaves, the lower ones from four to eight feet long, and narrow ; the superior ones shorter, broader, tapering from the base to a most fine point, strong, and rigid ; concave above, margins hispid. Sheathes from twelve to eighteen inches long, with a tuft of hair above their mouths on the inside. Panicle dense, when in flower open, when in seed condensed and of a lanceolate shape, from one to three feet long ; branches decom pound, or more ; the inferior alternate, the superior sub-verticelled with generally three sharp angles armed with small stiff bristles besides long white silky hairs. Flowers paired, one sessile, the other pedi-

celled. Calyx two-valved, clothed with long, soft, white, silky hairs. Corol three-valved, fringed. *S. spontaneum* grows to 8' with convolute leaves; *S. Sara* to 16' with flat leaves. The seeds and delicate pith are eaten in times of scarcity in the plains.

Scirpus Kysoor, Roxb. *Kesur* (Bengal), *kaseru* (Bijnor).

Belonging to the natural order *Cyperaceæ*. Root tuberous, with numerous ferruginous fibres. Culms straight, from four to six feet high, three-angled, the sides deeply grooved and the angles very sharp, and backwardly hispid. Leaves several to each culm, and about their length, sheathing at the base, above that part deeply channelled, with the margins and keel while young, somewhat hispid, and the points long and subulate. Umbel terminal, super-decomopound. Involucre about three, very unequal, the largest from one to two feet long, and the shortest as many inches; resembling the leaves in form. Spikes ovate, brown. Scales roundish oval, concave, chaffy, brown, smooth; the rib or nerve ending in a subulate point beyond the rounded apex. Stamens three on the exterior side of the germ, one-bearded bristle between each filament, and three on the back, making in all five. Germ ovate. Style with swelled, permanent, cordate base. Stigma three-cleft. Seed oblong, three-sided, surrounded by the five-bearded bristles. Roxburgh, 77; Drury, F. P., III., 529.

It approaches *S. grossus*, Vahl.; the best marks to distinguish them by, are the bristles which embrace the germ, and continue with the seed; here they are five in number and villous, there six and barbed, or armed on the margin, with sharp bristles pointing backward. The roots of *kaseru* which grows abundantly in wet places are dug up in large quantities in the cold weather for food. They are sliced and eaten uncooked and alone. In appearance they are like the roots of *Cyperus esculentus*, Linn., which are eaten in Europe and are considered cooling and highly nutritious. Stewart gives the vernacular name *kaseru* to *Cyperus tuberosus* (Roxburgh, 67) which itself is only a variety of *C. rotundus*.



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